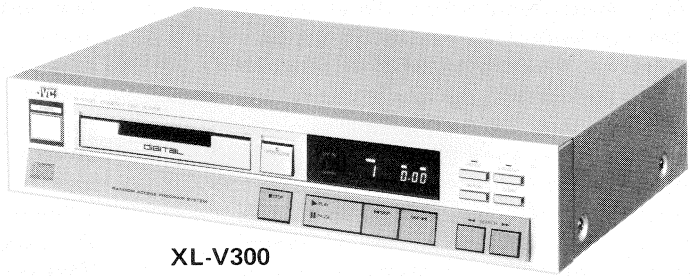
JVC

SERVICE MANUAL

COMPACT DISC PLAYER

MODEL XL-V300/XL-V300B



XL-V300

XL-V300B

COMPACT disc DIGITAL AUDIO

Contents

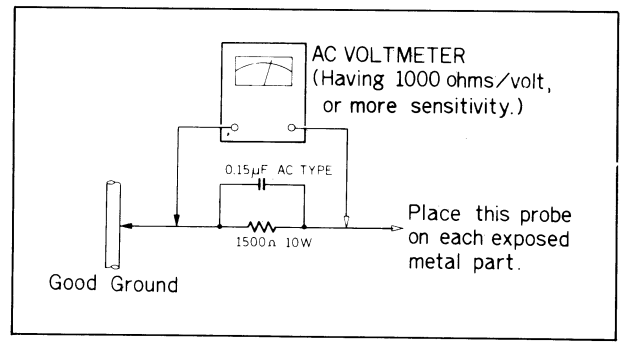
Safety Precautions 1-1
Laser Caution 1-2
1. Specifications 1-3
2. Before Use 1-3
3. Schematic Block Diagram 1-4
4. Description of Major LSI ICs 1-5
5. Other LSI ICs and Internal Block Diagrams of ICs . . 1-9
6. Disassembly Procedures 1-11
7. Application Points for Grease and Adhesive 1-12
8. Adjustment Procedure (Mechanical Adjustments) 1-12
9. Adjustment Procedure (Electric Adjustments) . . 1-13
10. Important Waveforms 1-16
11. Troubleshooting 1-18
Parts List . . . . . Separate-Volume Insertion
Connection Diagram . . . . . Insertion
Schematic Diagram . . . . . Insertion

This manual combines two single volumes; Service manual and Parts list.

No. 2781
Sept. 1984

Safety Precautions

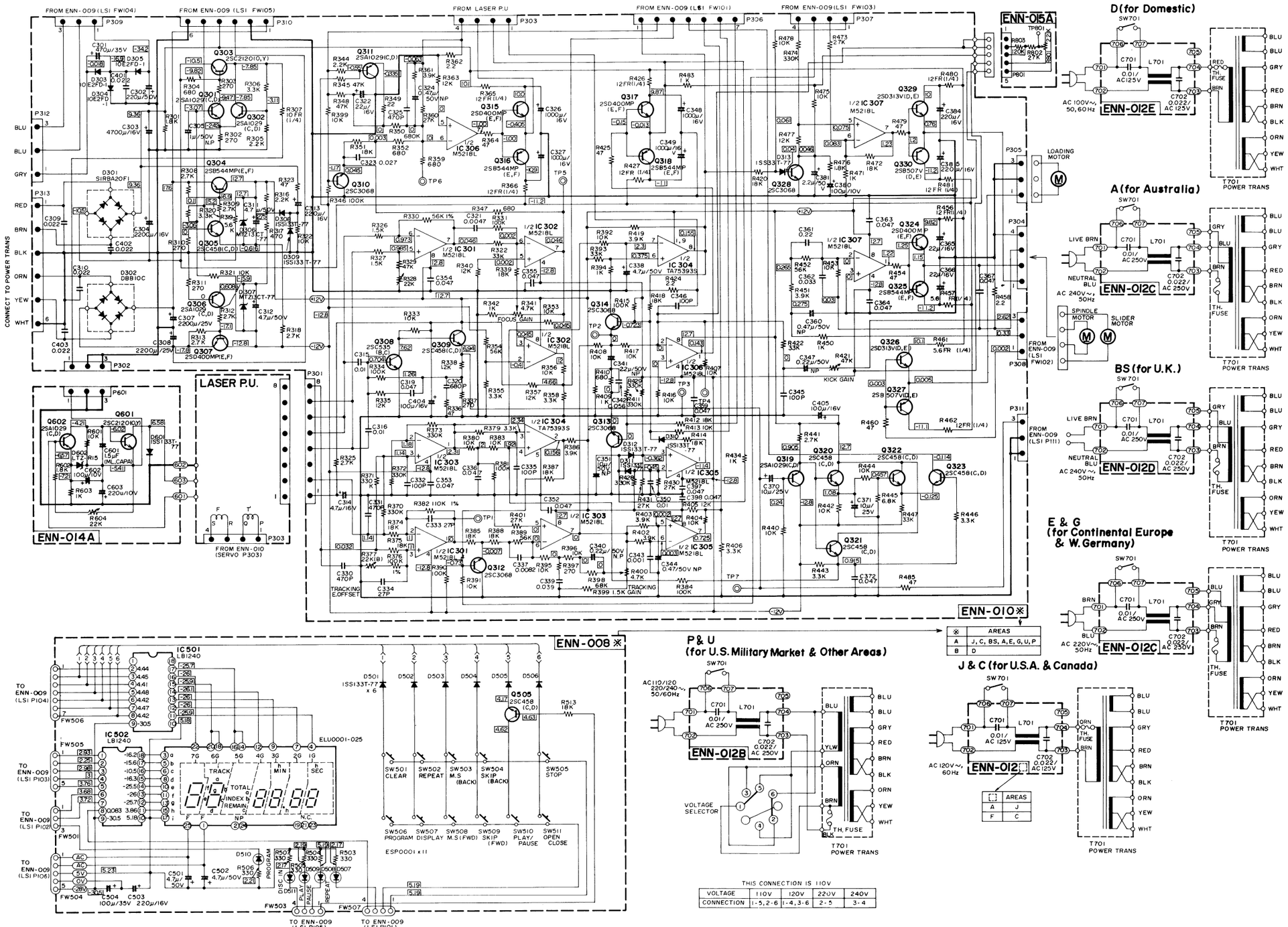
1. The design of this product contains special hardware, many circuits and components specially for safety purposes.
   For continued protection, no changes should be made to the original design unless authorized in writing by the manufacturer. Replacement parts must be identical to those used in the original circuits. Service should be performed by qualified personnel only.
2. Alterations of the design or circuitry of the product should not be made. Any design alterations or additions will void the manufacturer's warranty and will further relieve the manufacturer of responsibility for personal injury or property damage resulting therefrom.
3. Many electrical and mechanical parts in the product have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in the parts list of Service manual. Electrical components having such features are identified by shading on the schematics and by (⚠) on the parts list in Service manual. The use of a substitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the parts list in Service manual may create shock, fire, or other hazards.
4. The leads in the products are routed and dressed with ties, clamps, tubings, barriers and/or the like to be separated from live parts, high temperature parts, moving parts and/or sharp edges for the prevention of electric shock and fire hazard.
   When servicing is required, the original lead routing and dress should be observed, and they should be confirmed to be returned to normal after re-assembling.
5. Leakage current check
   (Safety for electrical shock hazard)
   After re-assembling the product, always perform an isolation check on the exposed metal parts of the product (antenna terminals, knobs, metal cabinet, screw heads, headphone jack, control shafts, etc.) to be sure the product is safe to operate without danger of electrical shock.
   Do not use a line isolation transformer during this check.
   - Plug the AC line cord directly into the AC outlet. Using a "Leakage Current Tester", measure the leakage current from each exposed metal part of the cabinet, particularly any exposed metal part having a return path to the chassis, to a known good ground. Any leakage current must not exceed 0.5 mA AC (r.m.s.).
   - Alternate check method
     Plug the AC line cord directly into the AC outlet. Use an AC voltmeter having 1,000 ohms per volt or more sensitivity in the following manner. Connect a 1500 Ω 10 W resistor paralleled by a 0.15 μF AC-type capacitor between an exposed metal part and a known good ground.
     Measure the AC voltage across the resistor with the AC voltmeter.
     Move the resistor connection to each exposed metal part, particularly any exposed metal part having a return path to the chassis, and measure the AC voltage across the resistor. Now, reverse the plug in the AC outlet and repeat each measurement. Any voltage measured must not exceed 0.75 V AC (r.m.s.). This corresponds to 0.5 mA AC (r.m.s.).



CHECKING YOUR LINE VOLTAGE (Except for U.S.A., Canada, Australia, U.K. and Continental Europe.)
Before inserting the power plug, please check this setting to see that it corresponds with the line voltage in your area. If it doesn't, be sure to adjust the voltage selector switch to the proper setting before operating this equipment. The voltage selector switch is located on the bottom board.

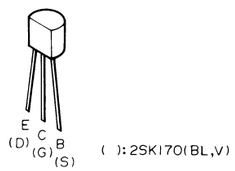
CAUTION Before selecting the "Voltage selector switch" to proper voltage disconnect the power plug.

(2) Servo Control & Power Supply Sections



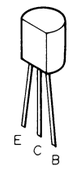
(3) Semiconductor External Views and Important IC Terminal Voltage Table

2SC2235(O,Y) 2SC3068
2SA1015(Y,GR) 2SK170(BL,V)
2SC458(C,D) 2SC2120(O,Y)
2SA1029(C,D) 2SC535(B,C)



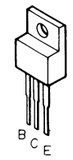
Q101, Q102, Q106, Q107, Q109, Q110
Q111, Q112, Q113, Q116, Q117, Q118
Q119, Q120, Q121, Q301, Q302, Q303
Q305, Q306, Q308, Q309, Q310, Q311
Q312, Q313, Q314, Q319, Q320, Q321
Q323, Q328, Q505

2SD400MP(E,F)
2SB544MP(E,F)



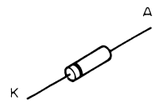
Q104, Q105, Q108, Q304
Q307, Q315, Q316, Q317
Q318, Q324, Q325

2SB507V(D,E)
2SD313V(D,E)



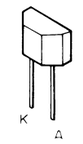
Q103, Q326, Q327
Q329, Q330

ISS133T-77
MTZ13CT-77
MTZ5.6CT-77
MTZ6.2CT-77



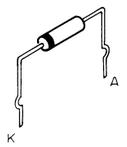
D101, D103, D104, D105, D106, D107
D108, D109, D110, D111, D114, D115
D116, D120, D306, D307, D308, D309
D310, D311, D312, D313, D501, D502
D503, D504, D505, D506

SVC321 SP-AW



D112

10E2FD-1

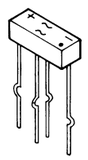


D303, D304, D305

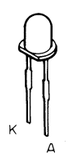
DBB10C

D302

SIRBA20F1

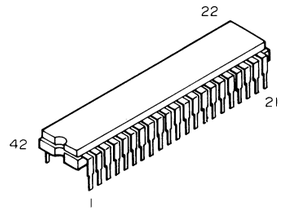


D301



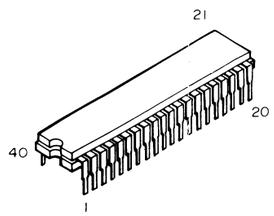
D507, D508, D509
D510, D511

MB8840IM-320K



IC101

YM3511

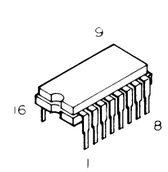


IC102

HM6116AP-15
PCM53JP-V

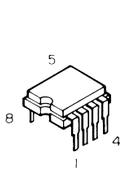
IC104, IC105

BU4053B
HD74LS42P



IC106, IC114

M5219P
M5220P(NJM5532D)
NJM4560D-X
(NJM5532D)

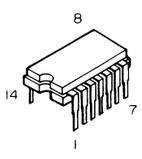


IC108, IC110, IC111
IC112, IC113

Important IC Terminal Voltage Table of LSI PCB (ENN-009)

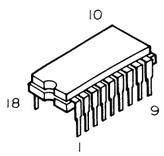
IC101				IC102				IC103						IC104		IC105		IC106	
1	2.41	26	2.26	1	5.24	26	0.009	1	0.0	26	2.28	51	1.92	1	2.08	1	2.00	1	0.002
2	2.39	27	2.26	2	2.19	27	0.375	2	5.04	27	2.31	52	1.98	2	2.08	2	2.12	2	0.004
3	2.42	28	3.03	3	2.40	28	0.105	3	0.0	28	2.27	53	2.03	3	2.06	3	2.17	3	0.001
4	5.23	29	3.03	4	2.62	29	1.77	4	2.47	29	2.30	54	0.025	4	2.05	4	2.09	4	0.002
5	0.225	30	3.03	5	0.006	30	0.001	5	1.13	30	2.02	55	0.025	5	2.06	5	2.09	5	0.002
6	0.461	31	5.22	6	2.64	31	5.08	6	0.289	31	2.45	56	5.07	6	2.06	6	2.07	6	0.004
7	0.273	32	0.0	7	2.07	32	5.09	7	5.04	32	1.49	57	0.025	7	1.95	7	2.07	7	-12.9
8	0.078	33	0.085	8	2.12	33	1.94	8	0.0	33	0.023	58	0.025	8	2.04	8	2.06	8	0.0
9	0.009	34	0.090	9	0.002	34	5.16	9	1.89	34	2.58	59	2.60	9	1.49	9	2.08	9	0.0
10	5.23	35	0.099	10	0.006	35	5.16	10	5.08	35	1.84	60	1.30	10	2.45	10	2.07	10	1.29
11	0.008	36	0.086	11	0.006	36	0.260	11	2.04	36	2.23	61	1.27	11	2.02	11	2.05	11	1.29
12	5.23	37	0.101	12	-0.006	37	0.013	12	1.95	37	1.99	62	5.33	12	0.0	12	2.06	12	1.29
13	5.23	38	5.23	13	4.58	38	0.291	13	2.06	38	2.06	63	1.38	13	2.30	13	1.99	13	0.004
14	4.87	39	0.271	14	0.082	39	1.61	14	2.06	39	2.05	64	0.821	14	2.27	14	2.23	14	0.002
15	0.009	40	0.283	15	-0.488	40	2.46	15	2.05	40	2.07			15	2.31	15	1.84	15	0.001
16	1.70	41	5.22	16	4.62			16	2.09	41	2.08			16	2.28	16	2.28	16	5.19
17	1.62	42	5.22	17	5.17			17	0.0	42	2.06			17	2.33	17	0.037		
18	5.23			18	0.010			18	2.08	43	2.07			18	0.007	18	5.23		
19	5.23			19	5.20			19	2.08	44	2.07			19	1.20	19	-12.00		
20	5.23			20	0.006			20	1.00	45	2.09			20	0.154	20	0.004		
21	0.008			21	5.50			21	2.08	46	2.09			21	0.330	21	0.004		
22	-0.170			22	0.008			22	0.330	47	2.17			22	2.08	22	0.033		
23	0.010			23	0.010			23	0.154	48	2.12			23	1.98	23	12.9		
24	0.045			24	0.008			24	1.20	49	2.06			24	5.28	24	5.29		
25	3.04			25	0.008			25	2.33	50	2.00								

BU4001BP



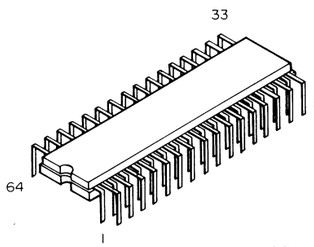
IC115

LB1240



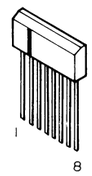
IC501, IC502

YM2201



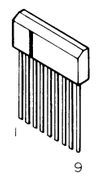
IC103

M5218L



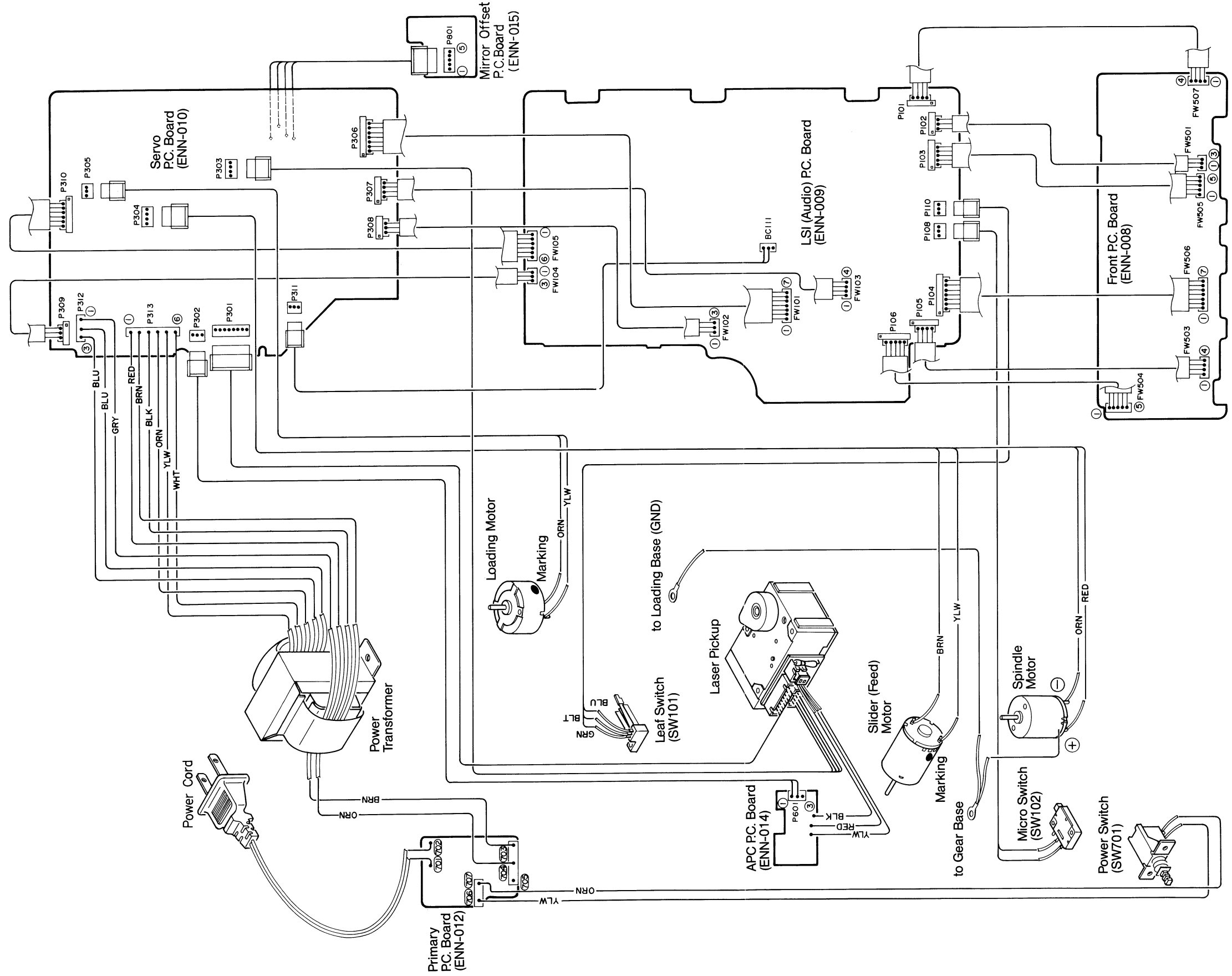
IC109, IC301, IC302, IC303
IC305, IC306, IC307

TA75393S



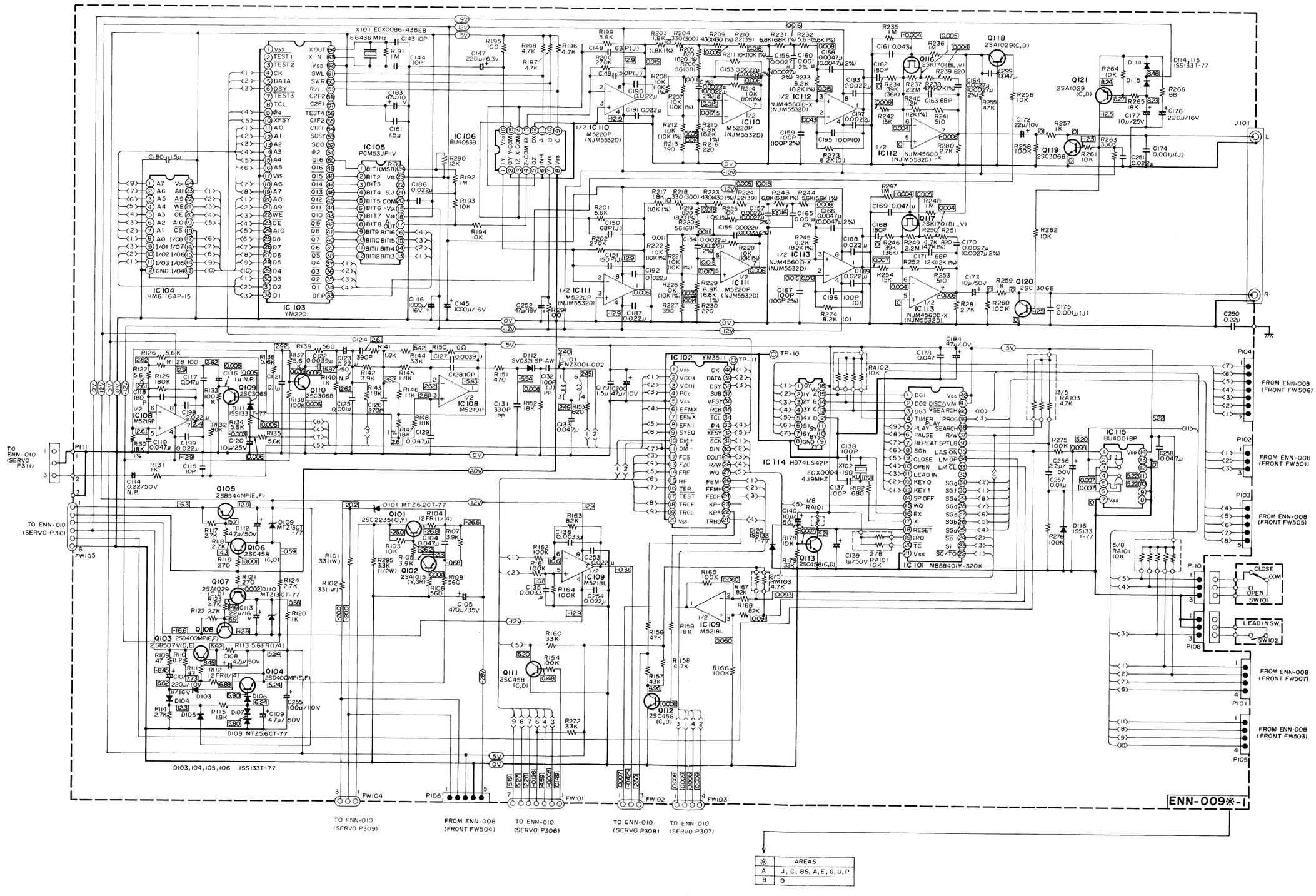
IC304

Connection Diagram



Schematic Diagram

(1) LSI (Audio) Section



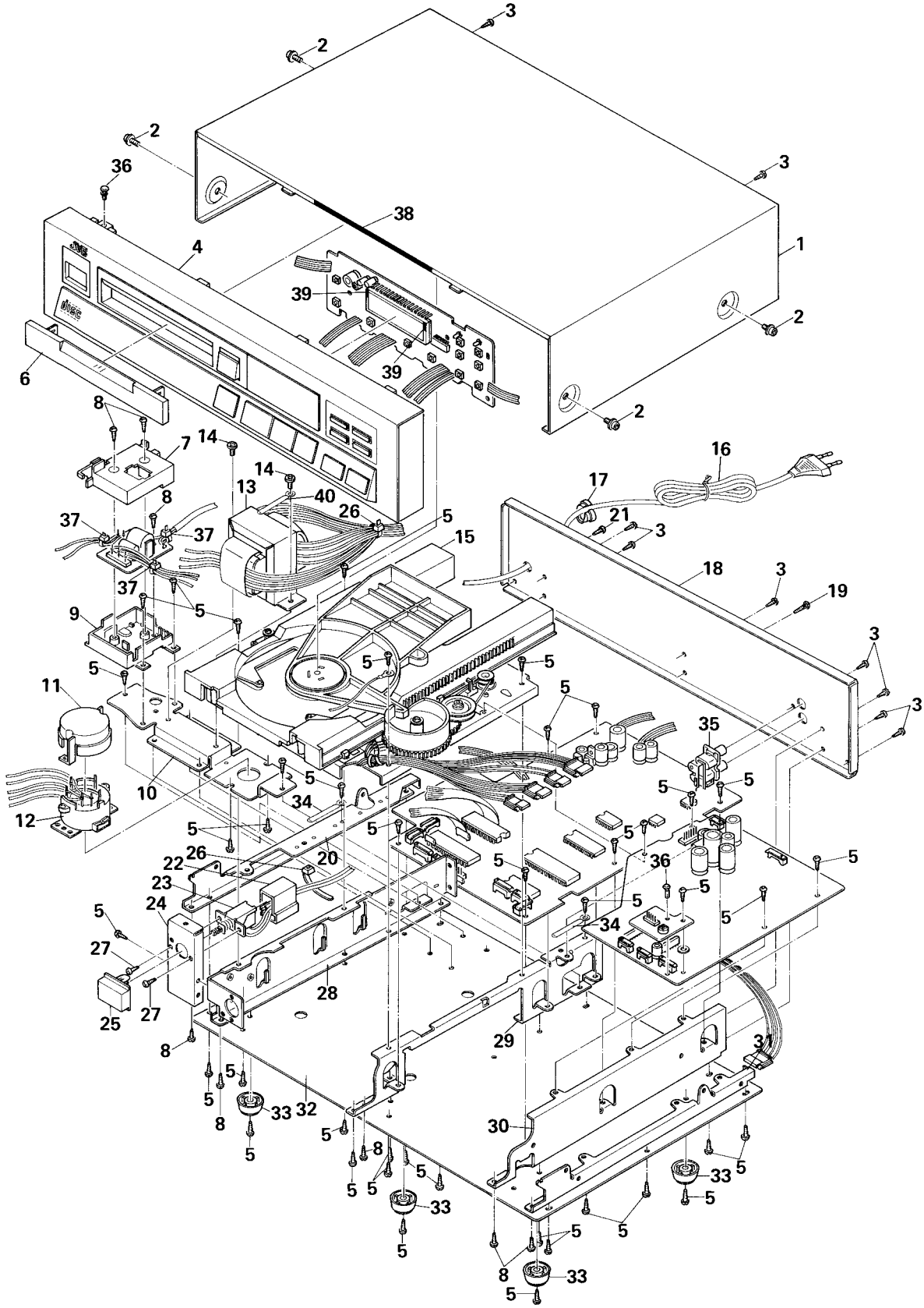
(No. 2781) (No. 2781)

PARTS LIST

Contents

1. Exploded View and Part Numbers 2-2
2. Front Panel Ass'y 2-4
3. Loading Ass'y 2-6
4. Mechanism Ass'y 2-8
5. Printed Circuit Board Ass'y and Parts List
   5-(1) ENN-009A LSI (Audio) P.C.Board Ass'y 2-10
   5-(2) ENN-010A Servo P.C.Board Ass'y 2-13
   5-(3) ENN-008A Front P.C.Board Ass'y 2-16
   5-(4) ENN-012□Primary P.C.Board Ass'y 2-17
   5-(5) ENN-014A APC (Auto Power Control) P.C.Board Ass'y 2-18
   5-(6) ENN-015A Mirror offset P.C. Board Ass'y 2-18
6. Packing Materials and Part Numbers 2-19
7. Accessories List . . . . . Back cover

1. Exploded View and Part Numbers



⚠	Item	Part Number	Part Name	Q'ty	Description	Areas
	1	E24835-001	Metal Cover	1	Silver	
		E24835-002	Metal Cover	1	Black	
	2	E61660-001	Screw	4	Silver	
		E61660-004	Screw	4	Black	
	3	SBSE3008N	Screw	2	Silver	
		SBSE3008M	Screw	2	Black	
	4	See page 2-4	Front Panel Ass'y	1		
	5	SBSE3008N	Screw	48		
	6	E303534-001	Window Screen	1	Silver	
		E303534-002	Window Screen	1	Black	
	7	E71761-003	Cover	1		J, C
		E71761-004	Cover	1		Except J, C
	8	SBSF3008Z	Screw		F	
	9	E71757-003	Case	1		J, C
		E71757-004	Case	1		Except J, C
	10	E71747-001	Trans Bracket	1		
	11	E302764-001	Voltage Select Cover	1		U, P, PG
⚠	12	QSR0085-008U	Voltage Selector	1		U, P, PG
⚠	13	ETP1020-09JA	Power Transformer	1		J, C
		ETP1020-09MA	Power Transformer	1		U, P, PG
		ETP1020-09EA	Power Transformer	1		E, A, G, ES
		ETP1020-09EABS	Power Transformer	1		BS
	14	E65389-002	Screw	2		
	15	See page 2-6	Loading and Mecha Ass'y	1		
⚠	16	QMP1200-200	Power Cord	1		J
		QMP1900-200	Power Cord	1		C
		QMP7600-250	Power Cord	1		U, P, PG
		QMP3900-200	Power Cord	1		E, G, ES
		QMP2560-244	Power Cord	1		A
		QMP9017-008BS	Power Cord	1		BS
	17	QHS3876-162	Cord Stopper	1		Except BS
		QHS3876-162BS	Cord Stopper	1		BS
	18	E24838-005	Rear Panel	1	Silver	
		E24838-006	Rear Panel	1	Black	
	19	E66052-001	Screw	1		
	20	E302818-001	Side Bracket	1	L	
	21	SBSE3008N	Screw	7	Silver	
		SBSE3008M	Screw	7	Black	
	22	E71004-001	Switch Cover	1		
⚠	23	QSP1106-004	Power Switch	1		Except BS
		QSP1106-004BS	Power Switch	1		BS
	24	E71764-001	Switch Bracket	1		
	25	VXP3108-001	Push knob	1	Silver	
		VXP3108-002	Push knob	1	Black	
	26	E33754-001	Tie Band	1		
	27	SBST3008N	Screw	2		
	28	E303545-001	Bracket A	1		
	29	E303546-001	Bracket B	1		
	30	E303547-001	C. B. Bracket	1		
	31	E302819-001	Side Bracket	1	R	
	32	E24834-001	Bottom Cover	1		Except U, P, PG
		E24834-002	Bottom Cover	1		U, P, PG

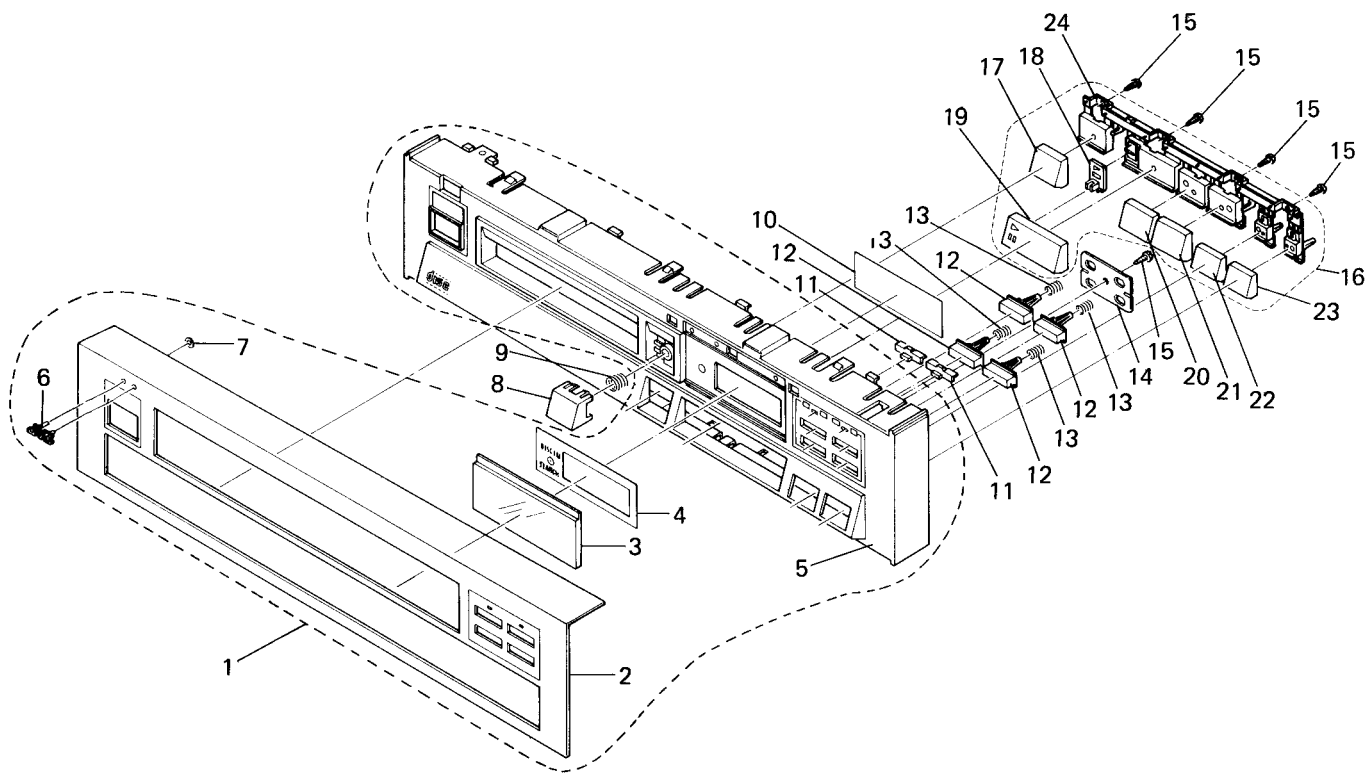
⚠	Item	Part Number	Part Name	Q'ty	Description	Areas
	33	E47227-006	Foot	4		
	34	E50670-005	Wire Clamp	1		
	35	EMN00TV-201A	2P Pin Jack	1		
	36	E48729-009	Plastic Rivet	1		
	37	E33754-001	Tie Band	3		U, P, PG, E, A, BS, G
	38	EXO090006H03S	Felt Spacer	1		
	39	EXO010005H05S	Felt Spacer	2		
	40	E72018-001	Wire Clamp	1		

⚠ : Safety Parts

The Marks for Designated Area

J	U.S.A.	ES	Spain
C	Canada	BS	U.K.
A	Australia	P, PG	U.S. Military Market
E	Europe	U	Other Countries
G	West Germany	No mark indicates all areas	

2. Front Panel Ass'y



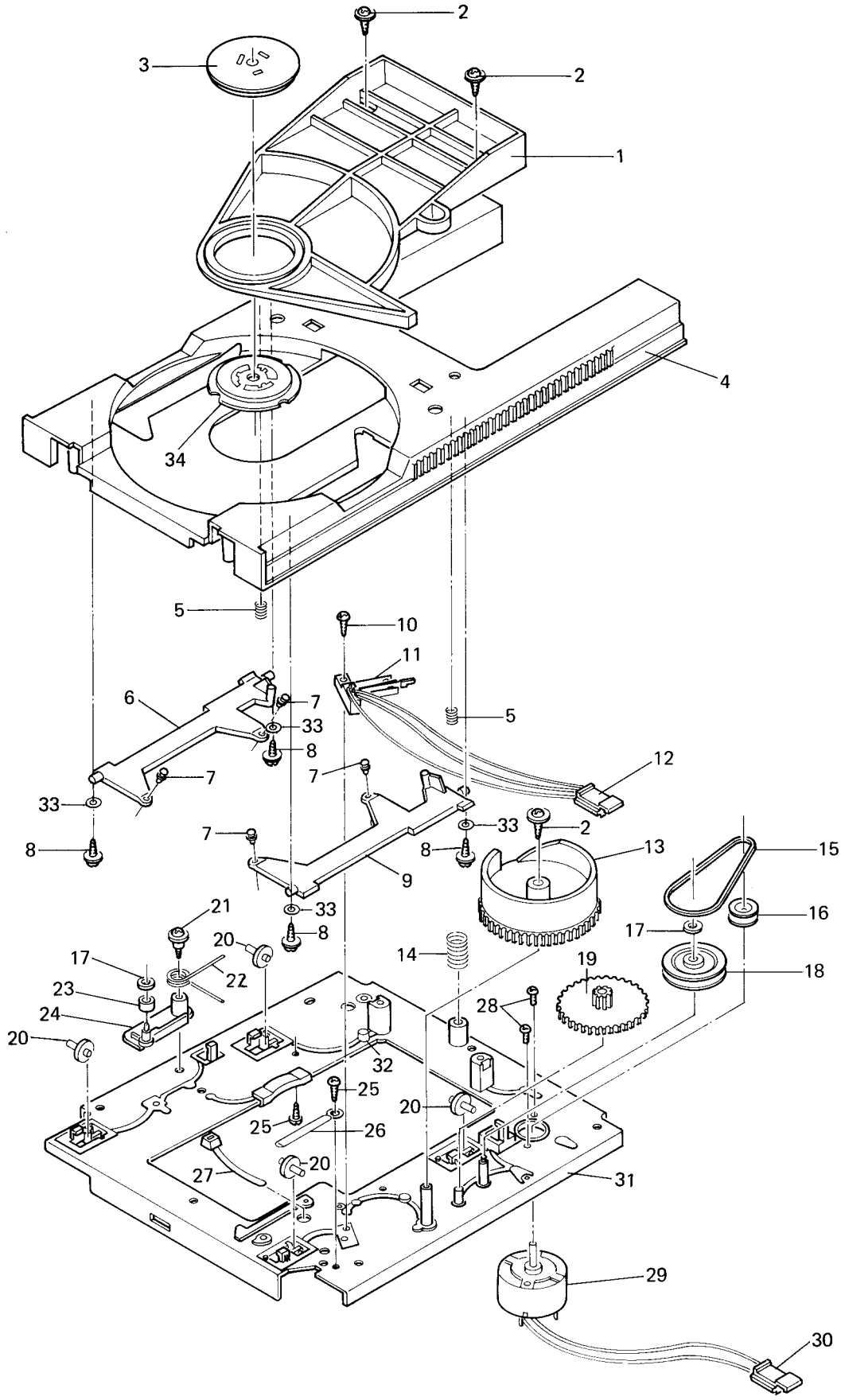
⚠	Item	Part Number	Part Name	Q'ty	Description	Areas
	1	EFP-XLV300E	Front Panel Ass'y	1	Silver	
		EFP-XLV300BE	Front Panel Ass'y	1	Black	
	2	E24833-001	Front Panel	1	Silver	
		E24833-002	Front Panel	1	Black	
	3	E71724-001	Window Screen	1		
	4	E71763-001	Sheet	1		
	5	E11040-001	Front Base	1	Silver	Except J, C
		E11040-002	Front Base	1	Black	Except J, C
		E11040-003	Front Base	1	Silver	J, C
		E11040-004	Front Base	1	Black	J, C
	6	E70913-002	Mark	1	Silver	
		E70913-001	Mark	1	Black	
	7	E60912-003	Speed Nut	1		
	8	E71748-003	Push Button	1	Silver	
		E71748-002	Push Button	1	Black	
	9	E66722-033	Coil Spring	1		
	10	E69230-012	FL Screen	1		
	11	E71750-001	Indicator	1		
	12	E71751-003	Push Button	4	Silver	
		E71751-002	Push Button	4	Black	
	13	E66722-031	Coil Spring	4		
	14	E71834-002	Plate	1		
	15	SBSF3008Z	Screw	6		
	16	E303548-001	Push Button Ass'y	1	Silver	
		E303548-002	Push Button Ass'y	1	Black	
	17	E71752-001	Cap	1	Silver	
		E71752-002	Cap	1	Black	
	18	E71765-001	Indicator	1		
	19	E71753-001	Cap	1	Silver	
		E71753-002	Cap	1	Black	
	20	E71754-001	Cap	1	Silver	
		E71754-002	Cap	1	Black	
	21	E71754-003	Cap	1	Silver	
		E71754-004	Cap	1	Black	
	22	E71755-001	Cap	1	Silver	
		E71755-002	Cap	1	Black	
	23	E71755-003	Cap	1	Silver	
		E71755-004	Cap	1	Black	
	24	E303549-001	Button Base	1		

⚠ : Safety Parts

The Marks for Designated Area

J . . . . . U.S.A.
C . . . . . Canada
No mark indicates all areas

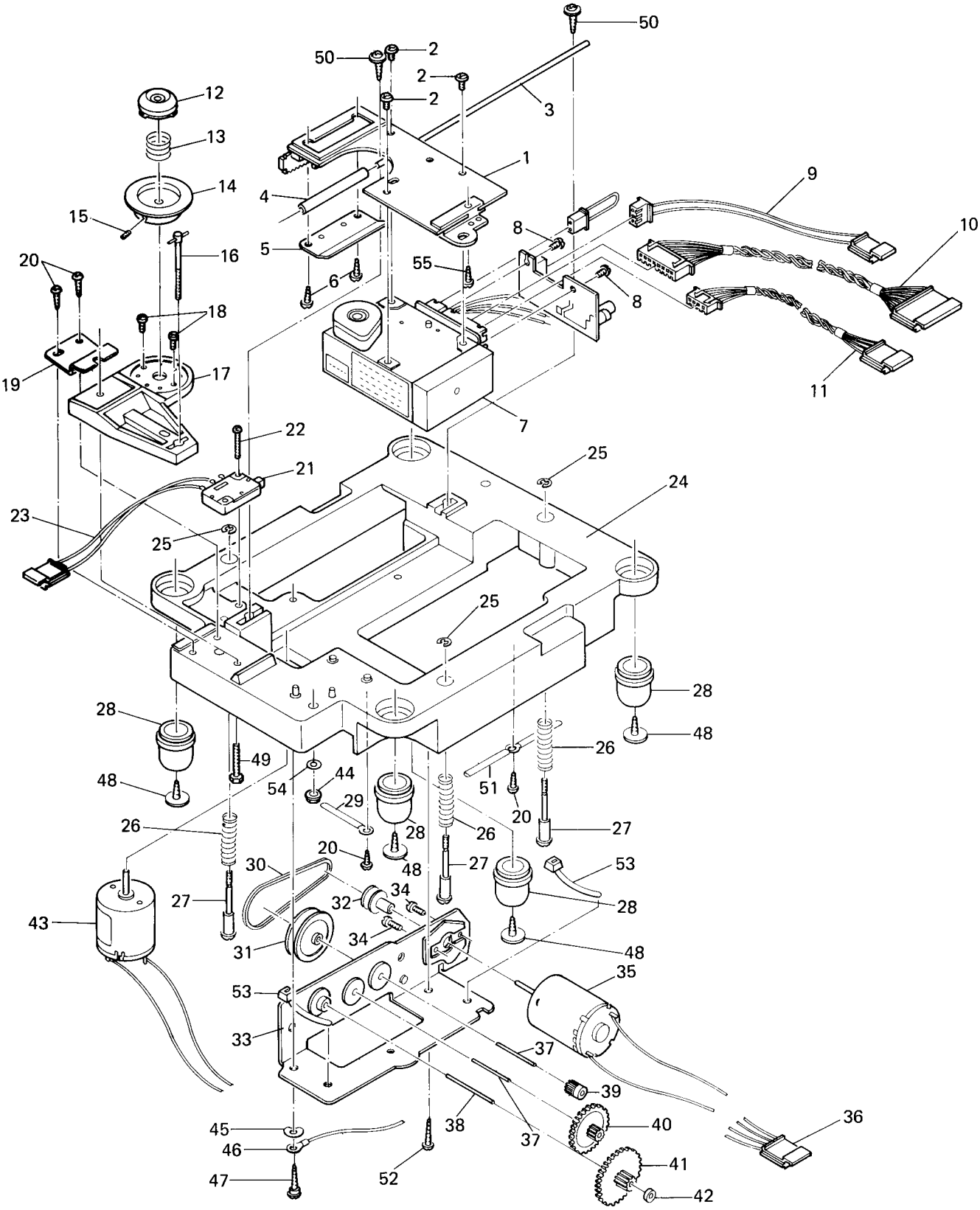
3. Loading Ass'y



⚠	Item	Part Number	Part Name	Q'ty	Description	Areas
	1	E24832-001	Holder	1		
	2	E65923-004	Screw	3		
	3	E303538-001	Catch Plate	1		
	4	E11038-001	Tray	1		
	5	E71727-001	Spring	2		
	6	E303535-002	Lever	1		
	7	E71726-001	Rubber	4		
	8	E65923-004	Screw	4		
	9	E303535-001	Lever	1		
	10	SBSB2608Z	Screw	1		
	11	ESB1200-001	Leaf Switch	1		
	12	EWS013-202	Socket Wire	1		
	13	E24830-002	Main Gear	1		
	14	E71730-001	Spring	1		
	15	E69879-002	Belt	1		
	16	E69608-002	Pulley	1		
	17	E60912-001	Speed Nut	2		
	18	E302848-001	Pulley	1		
	19	E71719-001	Sub Gear	1		
	20	E71718-001	Roller	4		
	21	E69851-002	Screw	1		
	22	E71723-001	Spring	1		
	23	E71722-002	Roller	1		
	24	E71721-001	Stopper	1		
	25	SBST3008Z	Screw	2		
	26	E50670-005	Wire Clamp	1		
	27	E33754-001	Tie Band	1		
	28	SPSP2606N	Screw	2		
	29	E71569-001	Motor	1		
	30	EWS013-206	Socket Wire	1		
	31	E11037-001	Base Ass'y	1		
	32	E70267-002	Rubber Tube	1		
	33	E72043-001	Washer	4		
	34	E303536-001	Magnet Ass'y	1		

⚠ : Safety Parts

4. Mechanism Ass'y

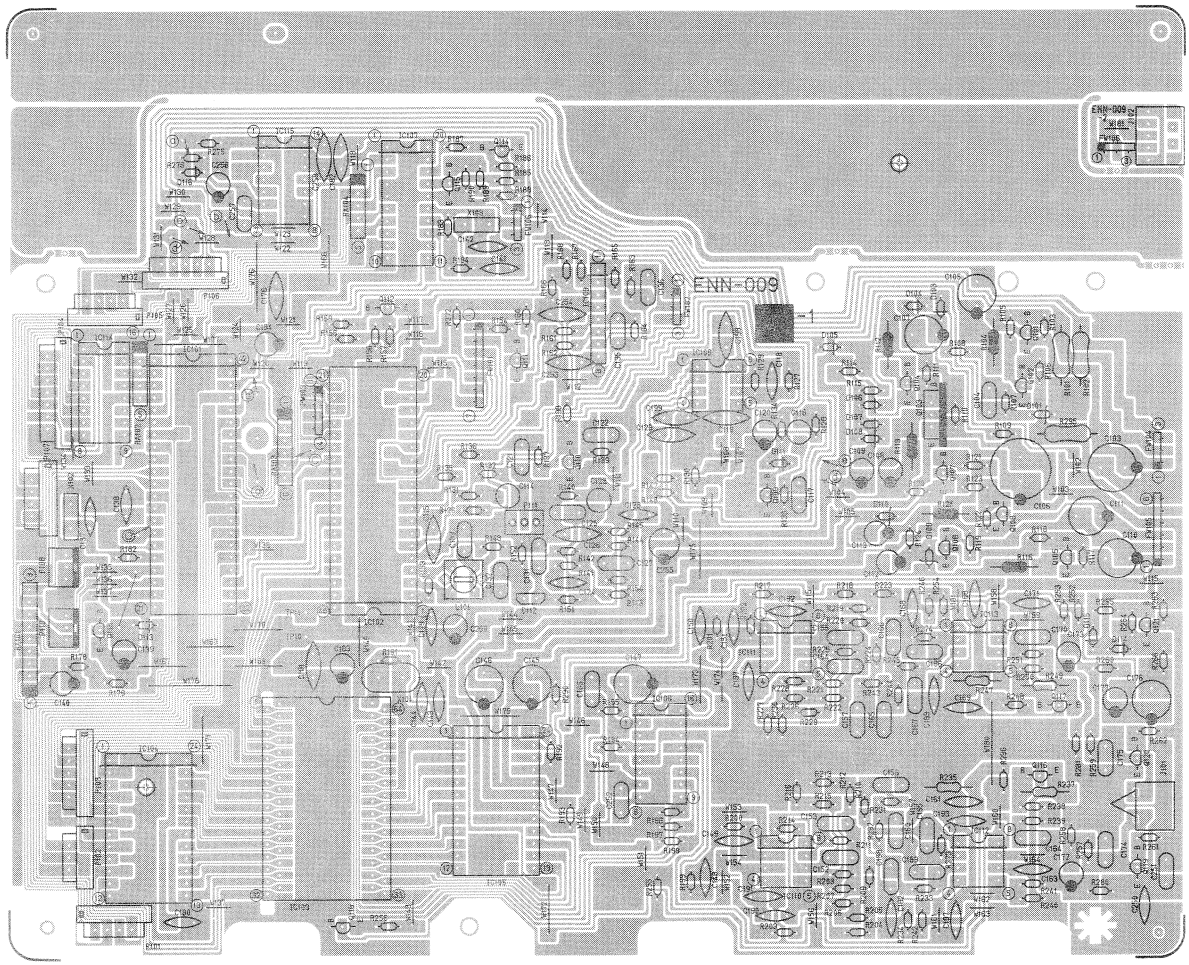


⚠	Item	Part Number	Part Name	Q'ty	Description	Areas
	1	E303544-001	Base Ass'y	1		
	2	SDSP2605N	Screw	3		
	3	E71742-001	Feed Shaft	1		
	4	E71744-001	Feed Bush	1		
	5	E71745-001	R. Plate	1		
	6	LPSP3010Z	Screw	2		
	7	E303687-001	PU Ass'y	1	MLP-1E	
	8	SPSP2005N	Screw	2		
	9	EWS01Z-053	Socket Wire	1		
	10	EWP203-014B	Socket Wire	1		
	11	EWP203-013	Socket Wire	1		
	12	E71741-001	Center Cap	1		
	13	E71740-001	M. C. Spring	1		
	14	E71739-002	Disc Base	1		
	15	YFS2008M	Set Screw	1		
	16	E71737-001	Screw	1		
	17	E303543-001	S.M. Base	1		
	18	SDSP2003N	Screw	2		
	19	E71736-001	M. B. Spring	1		
	20	EA4409-001	Screw	4		
	21	QSS1214-002	Slide Switch	1		
	22	E71799-001	Screw	1		
	23	EWS013-205	Socket Wire	1		
	24	E11039-001	Floating Base	1		
	25	REE2000X	E Ring	3		
	26	E66722-032	Coil Spring	3		
	27	E71801-001	Screw	3		
	28	E71746-003	Rubber	4		
	29	E50670-005	Wire Clamp	1		
	30	E69879-002	Belt	1		
	31	E71732-001	Feed Pulley	1		
	32	E69608-002	Pulley	1		
	33	E303540-001	Gear Base Ass'y	1		
	34	SPSP2606N	Screw	2		
	35	E70697-001	Motor	1		
	36	EWS014-109	Socket Wire	1		
	37	E71731-001	Shaft	2		
	38	E71731-002	Shaft	1		
	39	E71733-001	Feed Gear (A)	1		
	40	E71734-001	Feed Gear (B)	1		
	41	E303542-001	Feed Gear (C)	1		
	42	E72024-001	Speed Nut	1		
	43	VA-612R52	Motor	1		
	44	NFS3000Z	Nut	1		
	45	E71994-001	Wave Washer	1		
	46	EWT042-013	Terminal Wire	1		
	47	EA4412-001	Screw	1		
	48	E65923-003	Screw	4		
	49	BNS3020N	Screw	1		
	50	E71798-001	Screw	2		
	51	E47203-006	Wire Clamp	1		
	52	EA4409-002	Screw	1		
	53	E33754-001	Tie Band	2		
	54	WSS3000Z	Washer	1		
	55	GBSF3010Z	Screw	1		

⚠: Safety Parts

5. Printed Circuit Board Ass'y and Parts List

5-(1) ENN-009A LSI (Audio) P.C. Board Ass'y



Transistors

⚠	Item	Part Number	Description		Areas
				Maker	
	Q101	2SC2235(O, Y)	Silicon	Toshiba	
	Q102	2SA1015(Y,GR)	Silicon	Toshiba	
	Q103	2SB507V(D,E)	Silicon	Sanyo	
	Q104	2SD400MP(E,F)	Silicon	Sanyo	
	Q105	2SB544MP(E,F)	Silicon	Sanyo	
	Q106	2SC458(C,D)	Silicon	Hitachi	
	Q107	2SA1029(C,D)	Silicon	Hitachi	
	Q108	2SD400MP(E,F)	Silicon	Sanyo	
	Q109	2SC3068	Silicon	Sanyo	
	Q110	2SC3068	Silicon	Sanyo	
	Q111	2SC458(C,D)	Silicon	Hitachi	
	Q112	2SC458(C,D)	Silicon	Hitachi	
	Q113	2SC458(C,D)	Silicon	Hitachi	
	Q116	2SK170(BL,V)	F.E.T.	Toshiba	
	Q117	2SK170(BL,V)	F.E.T.	Toshiba	
	Q118	2SA1029(C,D)	Silicon	Hitachi	
	Q119	2SC3068	Silicon	Sanyo	
	Q120	2SC3068	Silicon	Sanyo	
	Q121	2SA1029(C,D)	Silicon	Hitachi	

I.C.s

⚠	Item	Part Number	Description		Areas
				Maker	
	IC101	MB88401M-320K	I.C.	Fujitsu	
	IC102	YM3511	I.C.	Yamaha	
	IC103	YM2201	I.C.	Yamaha	
	IC104	HM6116AP-15	I.C.	Hitachi	
	IC105	PCM53JP-V	I.C.	Barr-Brown	
	IC106	BU4053B	I.C.	Rohm	
	IC108	M5219P	I.C.	Mitsubishi	
	IC109	M5218L	I.C.	Mitsubishi	
	IC110	M5220P	I.C.	Mitsubishi	
	IC111	M5220P	I.C.	Mitsubishi	
	IC112	NJM4560D-X	I.C.	JRC	
	IC113	NJM4560D-X	I.C.	JRC	
	IC114	HD74LS42P	I.C.	Hitachi	
	IC115	BU4001B	I.C.	Rohm	

Diodes

⚠	Item	Part Number	Description	Maker	Areas
	D101	MTZ6.2C	Zener		
	D103	1SS133	Silicon	Rohm	
	D104	1SS133	Silicon	Rohm	
	D105	1SS133	Silicon	Rohm	
	D106	1SS133	Silicon	Rohm	
	D107	1SS133	Silicon	Rohm	
	D108	MTZ5.6C	Zener		
	D109	MTZ13C	Zener		
	D110	MTZ13C	Zener	Rohm	
	D111	1SS133	Silicon	Rohm	
	D112	SVC321SP-AW	Silicon	Sanyo	
	D114	1SS133	Silicon	Rohm	
	D115	1SS133	Silicon	Rohm	
	D116	1SS133	Silicon	Rohm	
	D120	1SS133	Silicon	Rohm	

Capacitors

⚠	Item	Part Number	Description			Areas
	C104	QFN31HK-473	0.047 μF	50 V	Mylar	
	C105	QET61VM-107	100 μF	35 V	Electro	
	C107	QET61AM-227	220 μF	10 V	Electro	
	C108	QET61HM-475	4.7 μF	50 V	Electro	
	C109	QET61HM-475	4.7 μF	50 V	Electro	
	C112	QET61HM-475	4.7 μF	50 V	Electro	
	C113	QET61CM-226	22 μF	16 V	Electro	
	C114	QEN61HM-224	0.22 μF	50 V	Non Pole	
	C115	QCT25CH-100	10 pF	50 V	Ceramic	
	C116	QEN61HM-105	1 μF	50 V	Non Pole	
	C117	QFN31HK-473	0.047 μF	50 V	Mylar	
	C118	QCT25CH-181	180 pF	50 V	Ceramic	
	C119	QCF31HP-473	0.047 μF	50 V	Ceramic	
	C120	QET61EM-106	10 μF	25 V	Electro	
	C121	QFV71HF-104	0.1 μF	50 V	T. Film	
	C122	QFN31HK-392	3900 pF	50 V	Mylar	
	C123	QEN61HM-224	0.22 μF	50 V	Non Pole	
	C124	QCS31HJ-391	390 pF	50 V	Ceramic	
	C125	QFM32AJ-152	1500 pF	100 V	Ceramic	
	C126	QCS31HJ-271	2700 pF	50 V	Ceramic	
	C127	QFN31HK-392	3900 pF	50 V	Mylar	
	C128	QCT25CH-100	10 pF	50 V	Ceramic	
	C129	QCF31HP-473	0.047 μF	50 V	Ceramic	
	C131	QFP31HJ-331	330 pF	50 V	Poly	
	C132	QFP31HJ-101	100 pF	50 V	Poly	
	C133	QFN31HK-473	0.047 μF	50 V	Mylar	
	C135	QFN31HK-332	3300 pF	50 V	Mylar	
	C136	QFN31HK-332	3300 pF	50 V	Mylar	
	C137	QCS31HJ-101	100 pF	50 V	Ceramic	
	C138	QCS21HJ-101	100 pF	50 V	Ceramic	
	C139	QET61HM-105	1 μF	50 V	Electro	
	C140	QET61HM-106	10 μF	50 V	Electro	
	C143	QCT25UJ-100	10 μF	50 V	Ceramic	
	C144	QCT25UJ-100	10 μF	50 V	Ceramic	
	C145	QETC1CM-227	220 μF	16 V	Electro	
	C146	QETC1CM-227	220 μF	16 V	Electro	
	C147	QET60JM-227	220 μF	6.3 V	Electro	
	C148	QCS31HJ-680	68 pF	50 V	Ceramic	
	C149	QCS31HJ-151	150 pF	50 V	Ceramic	
	C150	QCS31HJ-680	68 pF	50 V	Ceramic	
	C151	QCS31HJ-680	68 pF	50 V	Ceramic	
	C152	QFP31HP-222	2200 pF	50 V	Poly	
	C153	QFP31HP-222	2200 pF	50 V	Poly	
	C154	QFP31HP-222	2200 pF	50 V	Poly	
	C155	QFP31HP-222	2200 pF	50 V	Poly	
	C156	QFP31HP-272	2700 pF	50 V	Poly	
	C157	QFP31HP-272	2700 pF	50 V	Poly	
	C158	QFP31HP-472	4700 pF	50 V	Poly	
	C159	QFP31HP-101	100 pF	50 V	Poly	
	C160	QFP31HP-102	1000 pF	50 V	Poly	

Capacitors

⚠	Item	Part Number	Description			Areas
	C161	QCF31HP-473	0.047 μF	50 V	Ceramic	
	C162	QCS31HJ-331	330 pF	50 V	Ceramic	
	C163	QCS31HJ-680	68 pF	50 V	Ceramic	
	C164	QFP31HP-272	2700 pF	50 V	Poly	
	C165	QFP31HP-102	1000 pF	50 V	Poly	
	C166	QFP31HP-472	4700 pF	50 V	Poly	
	C167	QFP31HJ-101	100 pF	50 V	Poly	
	C168	QFP31HJ-181	180 pF	50 V	Poly	
	C169	QCF31HP-473	0.047 μF	50 V	Ceramic	
	C170	QFP31HJ-272	2700 pF	50 V	Poly	
	C171	QCS31HJ-680	68 pF	50 V	Ceramic	
	C172	QET61CM-226	22 μF	16 V	Electro	
	C173	QET61CM-226	22 μF	16 V	Electro	
	C174	QFN31HJ-102	1000 pF	50 V	Mylar	
	C175	QFN31HJ-102	1000 pF	50 V	Mylar	
	C176	QETC1CM-227	220 μF	16 V	Electro	
	C177	QET61EM-106	10 μF	25 V	Electro	
	C178	QCF21HP-473	0.047 μF	50 V	Ceramic	
	C179	QCZ0202-155	1.5 μF		Mylar	
	C180	QCZ0202-155	1.5 μF		Mylar	
	C181	QCZ0202-155	1.5 μF		Mylar	
	C182	QCF31HP-223	0.022 μF	50 V	Ceramic	
	C183	QET61AM-476	47 μF	10 V	Electro	
	C184	QET61AM-476	47 μF	10 V	Electro	
	C187	QCF31HP-223	0.022 μF	50 V	Ceramic	
	C188	QCF31HP-223	0.022 μF	50 V	Ceramic	
	C189	QCF31HP-223	0.022 μF	50 V	Ceramic	
	C190	QCF31HP-223	0.022 μF	50 V	Ceramic	
	C191	QCF21HP-223	0.022 μF	50 V	Ceramic	
	C192	QCF31HP-223	0.022 μF	50 V	Ceramic	
	C193	QCF21HP-223	0.022 μF	50 V	Ceramic	
	C195	QFP31HJ-101	100 pF	50 V	Poly	
	C196	QFP31HJ-101	100 pF	50 V	Poly	
	C197	QCF31HP-223	0.022 μF	50 V	Ceramic	
	C198	QCF31HP-223	0.022 μF	50 V	Ceramic	
	C199	QCF31HP-223	0.022 μF	50 V	Ceramic	
	C200	QET61AM-476	47 μF	10 V	Electro	
	C250	QFN31HJ-224	0.22 μF	50 V	Ceramic	
	C251	QCF31HP-223	0.022 μF	50 V	Ceramic	
	C252	QET61CM-476	47 μF	16 V	Electro	
	C253	QCF31HP-223	0.022 μF	50 V	Ceramic	
	C254	QCF31HP-223	0.022 μF	50 V	Ceramic	
	C255	QET61AM-107	100 μF	10 V	Electro	
	C256	QET61HM-225	2.2 μF	50 V	Electro	
	C257	QFM31HJ-103	0.01 μF	50 V	Mylar	
	C258	QCF31HP-473	0.047 μF	50 V	Ceramic	
	C299	QCF21HP-473	0.047 μF	50 V	Ceramic	

Resistors

⚠	Item	Part Number	Description			Areas
	R101	QRD125J-102	1 kΩ	1/2 W	UNF. Carbon	
	R102	QRD125J-102	1 kΩ	1/2 W	UNF. Carbon	
	R103	QRD161J-103	10 kΩ	1/6 W	Carbon	
⚠	R104	QRZ0062-120	12 Ω	1/4 W	Fusible	
	R105	QRD161J-392	3.9 kΩ	1/6 W	Carbon	
	R106	QRD161J-561	560 Ω	1/6 W	Carbon	
	R107	QRD161J-392	3.9 kΩ	1/6 W	Carbon	
	R108	QRD161J-561	560 Ω	1/6 W	Carbon	
	R109	QRD161J-470	47 Ω	1/6 W	Carbon	
	R110	QRD161J-8R2	8.2 Ω	1/6 W	Carbon	
	R111	QRD161J-470	47 Ω	1/6 W	Carbon	
	R112	QRZ0062-120	12 Ω	1/4 W	Fusible	
⚠	R113	QRZ0061-5R6	5.6 Ω	1/4 W	Fusible	
	R114	QRD161J-272	2.7 kΩ	1/6 W	Carbon	
	R115	QRD161J-182	1.8 kΩ	1/6 W	Carbon	
	R117	QRD161J-272	2.7 kΩ	1/6 W	Carbon	
	R118	QRD161J-272	2.7 kΩ	1/6 W	Carbon	
	R119	QRD161J-271	270 Ω	1/6 W	Carbon	
	R120	QRD161J-102	1 kΩ	1/6 W	Carbon	
	R121	QRD161J-271	270 Ω	1/6 W	Carbon	

Resistors

⚠	Item	Part Number	Description			Areas
	R122	QRD161J-272	2.7 kΩ	1/6 W	Carbon	
	R123	QRD161J-272	2.7 kΩ	1/6 W	Carbon	
	R124	QRD161J-272	2.7 kΩ	1/6 W	Carbon	
	R126	QRD161J-562	5.6 kΩ	1/6 W	Carbon	
	R127	QRD161J-562	5.6 kΩ	1/6 W	Carbon	
	R128	QRD161J-101	100 Ω	1/6 W	Carbon	
	R129	QRD161J-184	180 kΩ	1/6 W	Carbon	
	R130	QRV144F-1802A	18 kΩ	1/4 W	Carbon	
	R131	QRD161J-102	1 kΩ	1/6 W	Carbon	
	R132	QRD161J-123	12 kΩ	1/6 W	Carbon	
	R133	QRD161J-104	100 kΩ	1/6 W	Carbon	
	R134	QRD161J-562	5.6 kΩ	1/6 W	Carbon	
	R135	QRD161J-562	5.6 kΩ	1/6 W	Carbon	
	R136	QRD161J-562	5.6 kΩ	1/6 W	Carbon	
	R137	QRD161J-562	5.6 kΩ	1/6 W	Carbon	
	R138	QRD161J-104	100 kΩ	1/6 W	Carbon	
	R139	QRD161J-561	560 Ω	1/6 W	Carbon	
	R140	QRD161J-102	1 kΩ	1/6 W	Carbon	
	R141	QRD161J-182	1.8 kΩ	1/6 W	Carbon	
	R142	QRD161J-392	3.9 kΩ	1/6 W	Carbon	
	R143	QRD161J-182	1.8 kΩ	1/6 W	Carbon	
	R144	QRD161J-333	33 kΩ	1/6 W	Carbon	
	R145	QRD161J-182	1.8 kΩ	1/6 W	Carbon	
	R146	QRD161J-333	33 kΩ	1/6 W	Carbon	
	R147	QRV144F-1802A	18 kΩ	1/4 W	M.Film	
	R148	QRV144F-1802A	18 kΩ	1/4 W	M.Film	
	R150	QRD161J-683	68 kΩ	1/6 W	Carbon	
	R151	QRD161J-471	470 Ω	1/6 W	Carbon	
	R152	QRD161J-183	18 kΩ	1/6 W	Carbon	
	R153	QRD161J-821	820 Ω	1/6 W	Carbon	
	R154	QRD161J-104	100 kΩ	1/6 W	Carbon	
	R156	QRD161J-473	47 kΩ	1/6 W	Carbon	
	R157	QRD161J-433	43 kΩ	1/6 W	Carbon	
	R158	QRD161J-472	4.7 kΩ	1/6 W	Carbon	
	R159	QRD161J-183	18 kΩ	1/6 W	Carbon	
	R160	QRD161J-333	33 kΩ	1/6 W	Carbon	
	R161	QRD161J-104	100 kΩ	1/6 W	Carbon	
	R162	QRD161J-104	100 kΩ	1/6 W	Carbon	
	R163	QRD161J-823	82 kΩ	1/6 W	Carbon	
	R164	QRD161J-104	100 kΩ	1/6 W	Carbon	
	R165	QRD161J-104	100 kΩ	1/6 W	Carbon	
	R166	QRD161J-104	100 kΩ	1/6 W	Carbon	
	R167	QRD161J-683	68 kΩ	1/6 W	Carbon	
	R168	QRD161J-683	68 kΩ	1/6 W	Carbon	
	R178	QRD161J-103	10 kΩ	1/6 W	Carbon	
	R179	QRD161J-103	10 kΩ	1/6 W	Carbon	
	R182	QRD161J-681	680 Ω	1/6 W	Carbon	
	R186	QRD161J-103	10 kΩ	1/6 W	Carbon	
	R191	QRD161J-105	1 MΩ	1/6 W	Carbon	
	R192	QRD161J-105	1 MΩ	1/6 W	Carbon	
	R193	QRD161J-103	10 kΩ	1/6 W	Carbon	
	R194	QRD161J-123	12 kΩ	1/6 W	Carbon	
	R195	QRD161J-101	100 Ω	1/6 W	Carbon	
	R196	QRD161J-472	4.7 kΩ	1/6 W	Carbon	
	R197	QRD161J-472	4.7 kΩ	1/6 W	Carbon	
	R198	QRD161J-472	4.7 kΩ	1/6 W	Carbon	
	R199	QRD161J-562	5.6 kΩ	1/6 W	Carbon	
	R200	QRD161J-224	220 kΩ	1/6 W	Carbon	
	R201	QRD161J-562	5.6 kΩ	1/6 W	Carbon	
	R202	QRD161J-224	220 kΩ	1/6 W	Carbon	
	R203	QRD161J-182	1.8 kΩ	1/6 W	Carbon	
	R204	QRD161J-331	330 Ω	1/6 W	Carbon	
	R205	QRD161J-821	820 Ω	1/6 W	Carbon	
	R206	QRD161J-560	56 Ω	1/6 W	Carbon	
	R207	QRD161J-103	10 kΩ	1/6 W	Carbon	
	R208	QRD161J-103	10 kΩ	1/6 W	Carbon	
	R209	QRD161J-431	430 Ω	1/6 W	Carbon	
	R210	QRD161J-220	22 Ω	1/6 W	Carbon	
	R211	QRD161J-103	10 kΩ	1/6 W	Carbon	
	R212	QRD161J-103	10 kΩ	1/6 W	Carbon	

Resistors

⚠	Item	Part Number	Description			Areas
	R213	QRD161J-391	390 Ω	1/6 W	Carbon	
	R214	QRD161J-103	10 kΩ	1/6 W	Carbon	
	R215	QRD161J-682	6.8 kΩ	1/6 W	Carbon	
	R216	QRD161J-221	220 Ω	1/6 W	Carbon	
	R217	QRD161J-182	1.8 kΩ	1/6 W	Carbon	
	R218	QRD161J-331	330 Ω	1/6 W	Carbon	
	R219	QRD161J-821	820 Ω	1/6 W	Carbon	
	R220	QRD161J-560	56 Ω	1/6 W	Carbon	
	R221	QRD161J-103	10 kΩ	1/6 W	Carbon	
	R222	QRD161J-103	10 kΩ	1/6 W	Carbon	
	R223	QRD161J-431	430 Ω	1/6 W	Carbon	
	R224	QRD161J-220	22 Ω	1/6 W	Carbon	
	R225	QRD161J-103	10 kΩ	1/6 W	Carbon	
	R226	QRD161J-103	10 kΩ	1/6 W	Carbon	
	R227	QRD161J-391	390 Ω	1/6 W	Carbon	
	R228	QRD161J-103	10 kΩ	1/6 W	Carbon	
	R229	QRD161J-682	6.8 kΩ	1/6 W	Carbon	
	R230	QRD161J-221	220 Ω	1/6 W	Carbon	
	R231	QRD161J-682	6.8 kΩ	1/6 W	Carbon	
	R232	QRD161J-562	5.6 kΩ	1/6 W	Carbon	
	R233	QRD161J-822	8.2 kΩ	1/6 W	Carbon	
	R234	QRD161J-333	33 kΩ	1/6 W	Carbon	
	R235	QRD148J-105S	1 MΩ	1/4 W	Carbon	
	R236	QRD161J-105	1 MΩ	1/6 W	Carbon	
	R237	QRD148J-225S	2.2 MΩ	1/4 W	Carbon	
	R238	QRD161J-472	4.7 kΩ	1/6 W	Carbon	
	R239	QRD161J-821	820 Ω	1/6 W	Carbon	
	R240	QRD161J-123	12 kΩ	1/6 W	Carbon	
	R241	QRD161J-471	470 Ω	1/6 W	Carbon	
	R242	QRD161J-822	8.2 kΩ	1/6 W	Carbon	
	R243	QRD161J-682	6.8 kΩ	1/6 W	Carbon	
	R244	QRD161J-562	5.6 kΩ	1/6 W	Carbon	
	R245	QRD161J-223	22 kΩ	1/6 W	Carbon	
	R246	QRD161J-333	33 kΩ	1/6 W	Carbon	
	R247	QRD148J-105S	1 MΩ	1/4 W	Carbon	
	R248	QRD161J-105	1 MΩ	1/6 W	Carbon	
	R249	QRD148J-225S	2.2 MΩ	1/4 W	Carbon	
	R250	QRD161J-472	4.7 kΩ	1/6 W	Carbon	
	R251	QRD161J-821	820 Ω	1/6 W	Carbon	
	R252	QRD161J-123	12 kΩ	1/6 W	Carbon	
	R253	QRD161J-471	470 Ω	1/6 W	Carbon	
	R254	QRD161J-822	8.2 kΩ	1/6 W	Carbon	
	R255	QRD161J-473	47 kΩ	1/6 W	Carbon	
	R256	QRD161J-103	10 kΩ	1/6 W	Carbon	
	R257	QRD161J-102	1 kΩ	1/6 W	Carbon	
	R258	QRD161J-104	100 kΩ	1/6 W	Carbon	
	R259	QRD161J-102	1 kΩ	1/6 W	Carbon	
	R260	QRD161J-104	100 kΩ	1/6 W	Carbon	
	R261	QRD161J-103	10 kΩ	1/6 W	Carbon	
	R262	QRD161J-103	10 kΩ	1/6 W	Carbon	
	R263	QRD161J-334	330 kΩ	1/6 W	Carbon	
	R264	QRD161J-103	10 kΩ	1/6 W	Carbon	
	R265	QRD161J-183	18 kΩ	1/6 W	Carbon	
	R266	QRD161J-560	56 Ω	1/6 W	Carbon	
	R272	QRD161J-333	33 kΩ	1/6 W	Carbon	
	R273	QRD161J-822	8.2 kΩ	1/6 W	Carbon	
	R274	QRD161J-822	8.2 kΩ	1/6 W	Carbon	
	R275	QRD161J-104	100 kΩ	1/6 W	Carbon	
	R276	QRD161J-104	100 kΩ	1/6 W	Carbon	
	R280	QRD161J-272	2.7 kΩ	1/6 W	Carbon	
	R281	QRD161J-272	2.7 kΩ	1/6 W	Carbon	
	R290	QRD161J-123	12 kΩ	1/6 W	Carbon	
	R291	QRD161J-101	100 Ω	1/6 W	Carbon	
	R295	QRD125J-332	3.3 kΩ	1/6 W	Carbon	

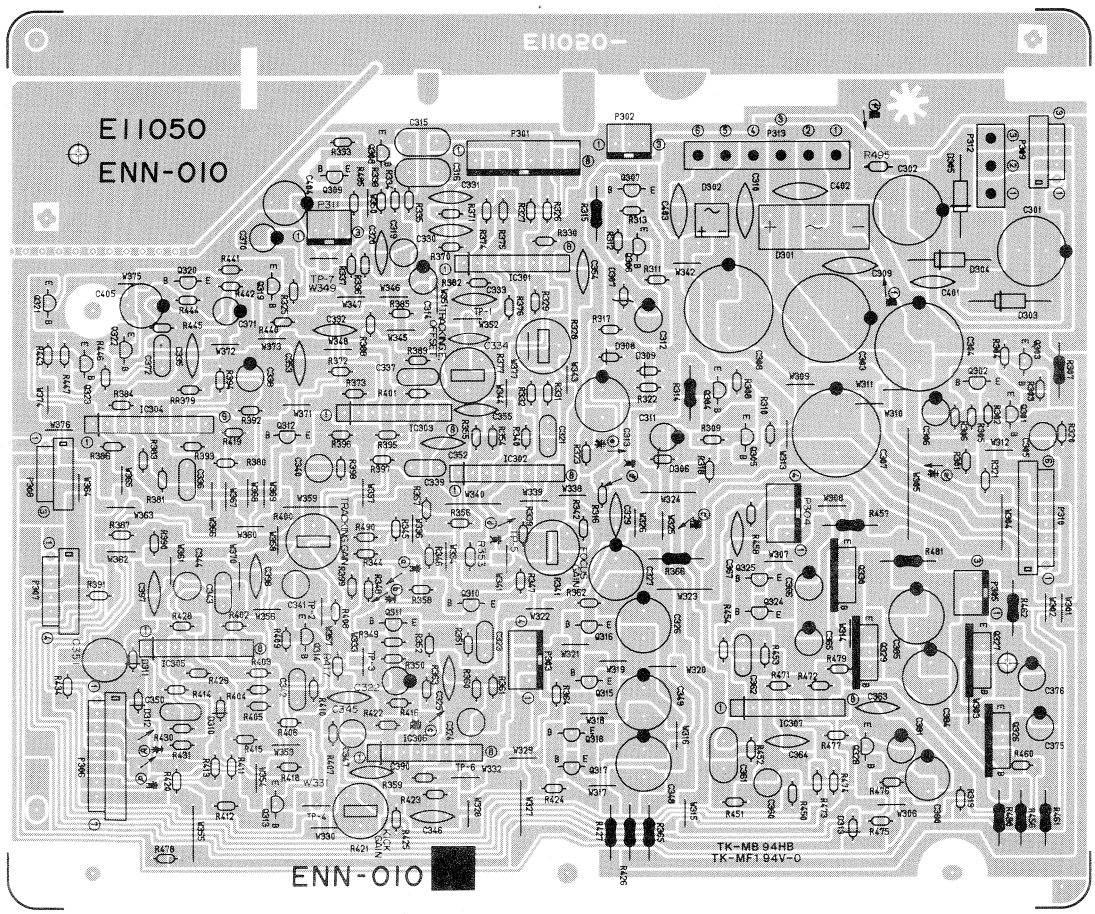
Others

⚠	Item	Part Number	Description	Areas
		E11049-101	Circuit Board	
	L101	ENZ3001-002	OSC. Coil	
	J101	EMN00TV-201A	2P Pin Jack	
	P101	E04365-004	Jumper Socket	
	P102	E04365-003	3P Socket	
	P103	E04365-005	F.W. Socket	
	P104	E04365-007	F.W. Socket	
	P105	E04365-004	Jumper Socket	
	P106	E04365-005	F.W. Socket	
	P108	QMV5005-003	3P Plug Ass'y	

Others

⚠	Item	Part Number	Description	Areas
	P110	QMV5005-003	3P Plug Ass'y	
	X101	ECX0086-436EB	X'tal	
	X102	ECX0004-190KU	Ceramic Oscillator	
	RA101	QRB082J-103	Resistor Array	
	RA102	QRB042J-103	Resistor Array	
	RA103	QRB052J-472	Resistor Array	

5-(2) ENN-010A Servo P.C. Board Ass'y



Transistors

⚠	Item	Part Number	Description		Areas
				Maker	
	Q301	2SA1029(C,D)	Silicon	Hitachi	
	Q302	2SA1029(C,D)	Silicon	Hitachi	
	Q303	2SC2120(O,Y)	Silicon	Toshiba	
	Q304	2SB544MP(E,F)	Silicon	Sanyo	
	Q305	2SC458(C,D)	Silicon	Hitachi	
	Q306	2SA1029(C,D)	Silicon	Hitachi	
	Q307	2SD400MP(E,F)	Silicon	Sanyo	
	Q308	2SC535(B,C)	Silicon		
	Q309	2SC458(C,D)	Silicon	Hitachi	
	Q310	2SC3068	Silicon	Sanyo	
	Q311	2SA1029(C,D)	Silicon	Hitachi	
	Q312	2SC3068	Silicon	Sanyo	
	Q313	2SC3068	Silicon	Sanyo	
	Q314	2SC3068	Silicon	Sanyo	
	Q315	2SD400MP(E,F)	Silicon	Sanyo	

Transistors

⚠	Item	Part Number	Description		Areas
				Maker	
	Q316	2SB544MP(E,F)	Silicon	Sanyo	
	Q317	2SD400MP(E,F)	Silicon	Sanyo	
	Q318	2SB544MP(E,F)	Silicon	Sanyo	
	Q319	2SA1029(C,D)	Silicon	Hitachi	
	Q320	2SC458(C,D)	Silicon	Sanyo	
	Q321	2SC458(C,D)	Silicon	Hitachi	
	Q322	2SC458(C,D)	Silicon	Hitachi	
	Q323	2SC458(C,D)	Silicon	Hitachi	
	Q324	2SD400MP(E,F)	Silicon	Sanyo	
	Q325	2SB544MP(E,F)	Silicon	Sanyo	
	Q326	2SD313V(D,E)	Silicon	Sanyo	
	Q327	2SB507V (D,E)	Silicon	Sanyo	
	Q328	2SC3068	Silicon	Sanyo	
	Q329	2SD313V(D,E)	Silicon	Sanyo	
	Q330	2SB507V(D,E)	Silicon	Sanyo	

I.C.s

⚠	Item	Part Number	Description		Areas
				Maker	
	IC301	M5218L	I.C.	Mitsubishi	
	IC302	M5218L	I.C.	Mitsubishi	
	IC303	M5218L	I.C.	Mitsubishi	
	IC304	TA75393S	I.C.	Toshiba	
	IC305	M5218L	I.C.	Mitsubishi	
	IC306	M5218L	I.C.	Mitsubishi	
	IC307	M5218L	I.C.	Mitsubishi	

Diodes

⚠	Item	Part Number	Description		Areas
				Maker	
	D301	SIRBA20F1	Silicon	Shindengen	
	D302	DBB10C	Silicon	Sanyo	
	D302	DBB10C	Silicon	Sanyo	
	D303	10E2FD-1	Silicon	Nippon Inter	
	D304	10E2FD-1	Silicon	Nippon Inter	
	D305	10E2FD-1	Silicon	Nippon Inter	
	D306	MTZ13C	Silicon	Rohm	
	D307	MTZ13C	Silicon	Rohm	
	D308	1SS133	Silicon	Rohm	
	D309	1SS133	Silicon	Rohm	
	D310	1SS133	Silicon	Rohm	
	D311	1SS133	Silicon	Rohm	
	D312	1SS133	Silicon	Rohm	
	D313	1SS133	Silicon	Rohm	

Capacitors

⚠	Item	Part Number	Description			Areas
	C301	QET51VM-477	470 μF	35 V	Electro	
	C302	QET51HM-227	220 μF	50 V	Electro	
	C303	QETB1CM-478	4700 μF	16 V	Electro	
	C304	QET51CM-228	2200 μF	16 V	Electro	
	C305	QEN61HM-105	1 μF	50 V	Electro	
	C306	QET61HM-474	0.47 μF	50 V	Electro	
	C307	QETB1CM-228	2200 μF	16 V	Electro	
	C308	QETB1EM-228	2200 μF	25 V	Electro	
	C309	QCF31HP-223	0.022 μF	50 V	Ceramic	
	C310	QCF31HP-223	0.022 μF	50 V	Ceramic	
	C311	QET61HM-475	4.7 μF	50 V	Electro	
	C312	QET61HM-475	4.7 μF	50 V	Electro	
	C313	QET51CM-227	220 μF	16 V	Electro	
	C314	QET61CM-476	47 μF	16 V	Electro	
	C315	QFN81HJ-103	0.01 μF	50 V	Mylar	
	C316	QFN81HJ-103	0.01 μF	50 V	Mylar	
	C319	QFN31HJ-473	0.047 pF	50 V	Ceramic	
	C320	QCS31HJ-681	680 pF	50 V	Ceramic	
	C321	QFN31HJ-102	1000 pF	50 V	Ceramic	
	C322	QET61CM-226	22 μF	16 V	Electro	
	C323	QFN31HJ-273	0.027 μF	50 V	Mylar	
	C324	QEN61HM-474	0.47 μF	50 V	Non Pole	
	C325	QCS31HJ-471	470 pF	50 V	Ceramic	
	C326	QET51CM-227	220 μF	16 V	Electro	
	C327	QET51CM-227	220 μF	16 V	Electro	
	C329	QCF31HP-473	0.047 μF	50 V	Ceramic	
	C330	QCS31HJ-471	470 pF	50 V	Ceramic	
	C331	QCS31HJ-471	470 pF	50 V	Ceramic	
	C332	QCS31HJ-101	100 pF	50 V	Ceramic	
	C333	QCS31HJ-270	27 pF	50 V	Ceramic	
	C334	QCS31HJ-270	27 pF	50 V	Ceramic	
	C335	QCS31HJ-101	100 pF	50 V	Ceramic	
	C336	QFN31HK-473	0.047 μF	50 V	Mylar	
	C337	QFN31HJ-822	8200 μF	50 V	Mylar	
	C338	QET61HM-475	4.7 μF	50 V	Electro	
	C339	QFN31HJ-473	0.047 μF	50 V	Mylar	
	C340	QEN61HM-224	0.22 μF	50 V	Non Pole	
	C341	QEN61HM-225	2.2 μF	50 V	Non Pole	
	C342	QFN31HJ-563	0.056 μF	50 V	Mylar	
	C343	QFN31HJ-102	1000 pF	50 V	Mylar	

Capacitors

⚠	Item	Part Number	Description			Areas
	C344	QEN61HM-474	0.47 μF	50 V	Non Pole	
	C345	QCS31HJ-471	470 pF	50 V	Ceramic	
	C346	QCS31HJ-101	100 pF	50 V	Ceramic	
	C347	QEN61HM-224	0.22 μF	50 V	Non Pole	
	C348	QET51CM-227	220 μF	16 V	Electro	
	C349	QET51CM-227	220 μF	16 V	Electro	
	C350	QCF31HP-103	0.01 μF	50 V	Ceramic	
	C351	QEN61HM-106	10 μF	50 V	Non Pole	
	C352	QCF31HP-473	0.047 μF	50 V	Ceramic	
	C353	QCF31HP-473	0.047 μF	50 V	Ceramic	
	C354	QCF31HP-473	0.047 μF	50 V	Ceramic	
	C355	QCF31HP-473	0.047 μF	50 V	Ceramic	
	C360	QEN61HM-474	0.47 μF	50 V	Non Pole	
	C361	QFV81HJ-224	0.22 μF	50 V	T.Film	
	C362	QFN31HK-333	0.033 μF	50 V	Mylar	
	C363	QCF31HP-473	0.047 μF	50 V	Ceramic	
	C364	QCF31HP-473	0.047 μF	50 V	Ceramic	
	C365	QET61CM-226	22 μF	16 V	Electro	
	C366	QET61CM-226	22 μF	16 V	Electro	
	C367	QCF31HP-473	0.047 μF	50 V	Ceramic	
	C370	QET61EM-106	10 μF	25 V	Electro	
	C371	QET61EM-106	10 μF	25 V	Electro	
	C372	QFN31HK-473	0.047 μF	50 V	Mylar	
	C375	QET61CM-226	22 μF	16 V	Electro	
	C376	QET61CM-226	22 μF	16 V	Electro	
	C380	QET61AM-107	100 μF	10 V	Electro	
	C381	QET61HM-225	2.2 μF	50 V	Electro	
	C384	QET51CM-227	220 μF	16 V	Electro	
	C385	QET51CM-227	220 μF	16 V	Electro	
	C397	QCF31HP-473	0.047 μF	50 V	Ceramic	
	C398	QCF31HP-473	0.047 μF	50 V	Ceramic	
	C401	QCF31HP-223	0.022 μF	50 V	Ceramic	
	C402	QCF31HP-223	0.022 μF	50 V	Ceramic	
	C403	QCF31HP-223	0.022 μF	50 V	Ceramic	
	C404	QET61CM-107	100 μF	16 V	Electro	
	C405	QET61CM-107	100 μF	16 V	Electro	

Resistors

⚠	Item	Part Number	Description			Areas
	R301	QRD161J-182	1.8 kΩ	1/6 W	Carbon	
	R302	QRD161J-271	270 Ω	1/6 W	Carbon	
	R303	QRD161J-271	270 Ω	1/6 W	Carbon	
	R304	QRD161J-681	680 Ω	1/6 W	Carbon	
	R305	QRD161J-222	2.2 kΩ	1/6 W	Carbon	
	R306	QRD161J-332	3.3 kΩ	1/6 W	Carbon	
⚠	R307	QRZ0062-100	10 Ω	1/4 W	Fusible	
	R308	QRD161J-272	2.7 kΩ	1/6 W	Carbon	
	R309	QRD161J-272	2.7 kΩ	1/6 W	Carbon	
	R310	QRD161J-271	270 Ω	1/6 W	Carbon	
	R311	QRD161J-271	270 Ω	1/6 W	Carbon	
	R312	QRD161J-272	2.7 kΩ	1/6 W	Carbon	
	R313	QRD161J-272	2.7 kΩ	1/6 W	Carbon	
⚠	R314	QRZ0062-120	12 Ω	1/4 W	Fusible	
⚠	R315	QRZ0062-120	12 Ω	1/4 W	Carbon	
	R316	QRD161J-222	2.2 kΩ	1/6 W	Carbon	
	R317	QRD161J-471	470 Ω	1/6 W	Carbon	
	R318	QRD161J-272	2.7 kΩ	1/6 W	Carbon	
	R319	QRD161J-562	5.6 kΩ	1/6 W	Carbon	
	R320	QRD161J-332	3.3 kΩ	1/6 W	Carbon	
	R321	QRD161J-103	10 kΩ	1/6 W	Carbon	
	R322	QRD161J-103	10 kΩ	1/6 W	Carbon	
	R323	QRD161J-470	47 Ω	1/6 W	Carbon	
	R325	QRD161J-272	2.7 kΩ	1/6 W	Carbon	
	R326	QRD161J-152	1.5 kΩ	1/6 W	Carbon	
	R327	QRD161J-152	1.5 kΩ	1/6 W	Carbon	
	R328	QVP4A0B-223	22 kΩ		Variable	
	R329	QRD161J-473	47 kΩ	1/6 W	Carbon	
	R330	QRV144F-5602A		1/4 W	O.M.Film	
	R331	QRD161J-104	100 kΩ	1/6 W	Carbon	
	R332	QRD161J-273	27 kΩ	1/6 W	Carbon	

⚠ : Safety Parts

Resistors

⚠	Item	Part Number	Description	Areas
	R333	QRD161J-103	10 kΩ 1/6 W Carbon	
	R334	QRD161J-104	100 kΩ 1/6 W Carbon	
	R335	QRD161J-123	12 kΩ 1/6 W Carbon	
	R336	QRD161J-470	47 Ω 1/6 W Carbon	
	R337	QRD161J-271	270 Ω 1/6 W Carbon	
	R338	QRD161J-112	1.2 kΩ 1/6 W Carbon	
	R339	QRD161J-183	18 kΩ 1/6 W Carbon	
	R340	QRD161J-123	12 kΩ 1/6 W Carbon	
	R341	QVP4A0B-472	4.7 kΩ 1/6 W Valiable	
	R342	QRD161J-102	1 kΩ 1/6 W Carbon	
	R344	QRD161J-222	2.2 kΩ 1/6 W Carbon	
	R345	QRD161J-473	47 kΩ 1/6 W Carbon	
	R346	QRD161J-104	100 kΩ 1/6 W Carbon	
	R347	QRD161J-681	680 Ω 1/6 W Carbon	
	R348	QRD161J-473	47 kΩ 1/6 W Carbon	
	R349	QRD161J-220	22 Ω 1/6 W Carbon	
	R350	QRD161J-684	680 kΩ 1/6 W Carbon	
	R351	QRD161J-183	18 kΩ 1/6 W Carbon	
	R352	QRD161J-681	680 Ω 1/6 W Carbon	
	R353	QRD161J-103	10 kΩ 1/6 W Carbon	
	R354	QRD161J-563	56 kΩ 1/6 W Carbon	
	R355	QRD161J-332	3.3 kΩ 1/6 W Carbon	
	R356	QRD161J-103	10 kΩ 1/6 W Carbon	
	R357	QRD161J-123	12 kΩ 1/6 W Carbon	
	R358	QRD161J-332	3.3 kΩ 1/6 W Carbon	
	R359	QRD161J-681	680 Ω 1/6 W Carbon	
	R360	QRD161J-273	27 kΩ 1/6 W Carbon	
	R361	QRD161J-392	3.9 kΩ 1/6 W Carbon	
	R363	QRD161J-123	12 kΩ 1/6 W Carbon	
	R364	QRD161J-470	47 Ω 1/6 W Carbon	
⚠	R365	QRZ0062-120	12 Ω 1/4 W Fusible	
⚠	R366	QRZ0062-120	12 Ω 1/4 W Fusible	
	R370	QRD161J-334	330 kΩ 1/6 W Carbon	
	R371	QRD161J-334	330 kΩ 1/6 W Carbon	
	R372	QRD161J-334	330 kΩ 1/6 W Carbon	
	R373	QRD161J-334	330 kΩ 1/6 W Carbon	
	R374	QRD161J-183	18 kΩ 1/6 W Carbon	
	R375	QRD161J-183	18 kΩ 1/6 W Carbon	
	R377	QVP4A0B-223	22 kΩ 0.1 W Variable	
	R380	QRD161J-103	10 kΩ 1/6 W Carbon	
	R381	QRD161J-104	100 kΩ 1/6 W Carbon	
	R383	QRD161J-103	10 kΩ 1/6 W Carbon	
	R384	QRD161J-104	100 kΩ 1/6 W Carbon	
	R385	QRD161J-183	18 kΩ 1/6 W Carbon	
	R356	QRD161J-392	3.9 kΩ 1/6 W Carbon	
	R387	QRD161J-183	18 kΩ 1/6 W Carbon	
	R388	QRD161J-183	18 kΩ 1/6 W Carbon	
	R389	QRD161J-563	56 kΩ 1/6 W Carbon	
	R390	QRD161J-104	100 kΩ 1/6 W Carbon	
	R391	QRD161J-103	10 kΩ 1/6 W Carbon	
	R392	QRD161J-103	10 kΩ 1/6 W Carbon	
	R393	QRD161J-333	33 kΩ 1/6 W Carbon	
	R394	QRD161J-102	1 kΩ 1/6 W Carbon	
	R395	QRD161J-103	10 kΩ 1/6 W Carbon	
	R396	QRD161J-103	10 kΩ 1/6 W Carbon	
	R397	QRD161J-271	270 Ω 1/6 W Carbon	
	R398	QRD161J-683	68 kΩ 1/6 W Carbon	
	R399	QRD161J-152	1.5 kΩ 1/6 W Carbon	
	R400	QVP4A0B-472	4.7 kΩ Variable	
	R401	QRD161J-273	27 kΩ 1/6 W Carbon	
	R402	QRD161J-392	3.9 kΩ 1/6 W Carbon	
	R403	QRD161J-392	3.9 kΩ 1/6 W Carbon	
	R404	QRD161J-103	10 kΩ 1/6 W Carbon	
	R405	QRD161J-123	12 kΩ 1/6 W Carbon	
	R407	QRD161J-103	10 kΩ 1/6 W Carbon	
	R408	QRD161J-103	10 kΩ 1/6 W Carbon	
	R409	QRD161J-102	1 kΩ 1/6 W Carbon	
	R410	QRD161J-681	680 Ω 1/6 W Carbon	
	R411	QRD161J-334	330 kΩ 1/6 W Carbon	
	R412	QRD161J-183	18 kΩ 1/6 W Carbon	

⚠ : Safety Parts

Resistors

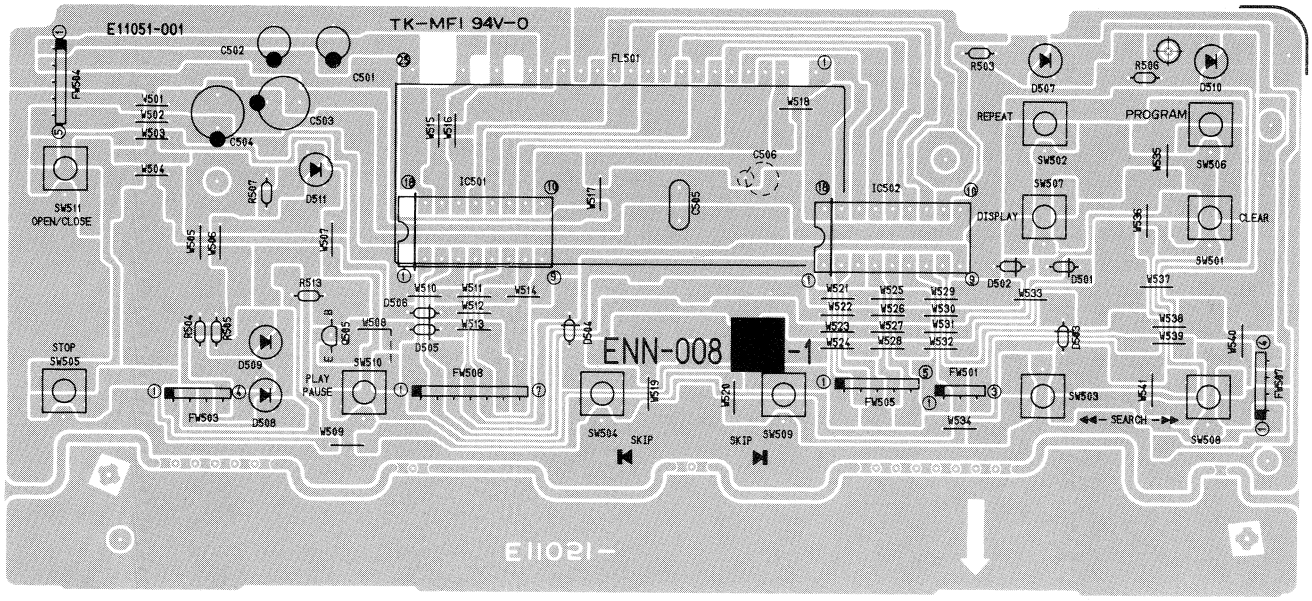
⚠	Item	Part Number	Description	Areas
	R413	QRD161J-103	10 kΩ 1/6 W Carbon	
	R414	QRD161J-183	18 kΩ 1/6 W Carbon	
	R415	QRD161J-104	100 kΩ 1/6 W Carbon	
	R416	QRD161J-103	10 kΩ 1/6 W Carbon	
	R417	QRD161J-103	10 kΩ 1/6 W Carbon	
	R418	QRD161J-183	18 kΩ 1/6 W Carbon	
	R419	QRD161J-392	3.9 kΩ 1/6 W Carbon	
	R420	QRD161J-183	18 kΩ 1/6 W Carbon	
	R421	QVP4A0B-473	47 kΩ Valiable	
	R422	QRD161J-333	33 kΩ 1/6 W Carbon	
	R423	QRD161J-273	27 kΩ 1/6 W Carbon	
	R425	QRD161J-470	47 Ω 1/6 W Carbon	
⚠	R426	QRZ0062-120	12 Ω 1/4 W Fusible	
⚠	R427	QRZ0062-120	12 Ω 1/4 W Fusible	
	R428	QRD161J-334	330 kΩ 1/6 W Carbon	
	R429	QRD161J-334	330 kΩ 1/6 W Carbon	
	R430	QRD161J-273	27 kΩ 1/6 W Carbon	
	R431	QRD161J-273	27 kΩ 1/6 W Carbon	
	R434	QRD161J-102	1 kΩ 1/6 W Carbon	
	R440	QRD161J-103	10 kΩ 1/6 W Carbon	
	R441	QRD161J-272	2.7 kΩ 1/6 W Carbon	
	R442	QRD161J-103	10 kΩ 1/6 W Carbon	
	R444	QRD161J-103	10 kΩ 1/6 W Carbon	
	R445	QRD161J-682	6.8 kΩ 1/6 W Carbon	
	R447	QRD161J-333	33 kΩ 1/6 W Carbon	
	R450	QRD161J-102	1 kΩ 1/6 W Carbon	
	R451	QRD161J-392	3.9 kΩ 1/6 W Carbon	
	R452	QRD161J-563	56 kΩ 1/6 W Carbon	
	R453	QRD161J-103	10 kΩ 1/6 W Carbon	
	R454	QRD161J-470	47 Ω 1/6 W Carbon	
⚠	R456	QRZ0062-120	12 Ω 1/4 W Fusible	
	R460	QRD161J-470	47 Ω 1/6 W Carbon	
⚠	R462	QRZ0062-120	12 Ω 1/4 W Fusible	
	R471	QRD161J-102	1 kΩ 1/6 W Carbon	
	R472	QRD161J-183	18 kΩ 1/6 W Carbon	
	R473	QRD161J-273	27 kΩ 1/6 W Carbon	
	R474	QRD161J-334	330 kΩ 1/6 W Carbon	
	R475	QRD161J-103	10 kΩ 1/6 W Carbon	
	R476	QRD161J-182	1.8 kΩ 1/6 W Carbon	
	R477	QRD161J-123	12 kΩ 1/6 W Carbon	
	R478	QRD161J-103	10 kΩ 1/6 W Carbon	
	R479	QRD161J-470	47 Ω 1/6 W Carbon	
⚠	R480	QRZ0062-120	12 Ω 1/4 W Fusible	
⚠	R481	QRZ0062-120	12 kΩ 1/4 W Fusible	
	R485	QRD161J-470	470 Ω 1/6 W Carbon	
	R490	QRD161J-103	10 kΩ 1/6 W Carbon	

⚠ : Safety Parts

Others

⚠	Item	Part Number	Description	Areas
		E11050-101	Circuit Board	
	P301	QMV5005-008	8P Plug Ass'y	
	P302	QMV5005-003	3P Plug Ass'y	
	P303	QMV5005-004	4P Plug Ass'y	
	P304	QMV5005-004	4P Plug Ass'y	
	P305	QMV5005-003	3P Plug Ass'y	
	P306	E04365-007	F.W. Socket	
	P307	E04365-004	Jumper Socket	
	P308	E04365-003	3P Plug Ass'y	
	P309	E04365-003	3P Plug Ass'y	
	P310	E04365-006	6P Plug Ass'y	
	P311	QMV5005-003	3P Plug Ass'y	
	P312	E67764-003	Terminal	
	P313	E67764-006	Terminal	

5-(3) ENN-008A Front P.C. Board Ass'y



Transistors

⚠	Item	Part Number	Description		Areas
				Maker	
	Q505	2SC458(C,D)	Silicon	Hitachi	

I.C.s

⚠	Item	Part Number	Description		Areas
				Maker	
	IC501	LB1240	I.C.	Sanyo	
	IC502	LB1240	I.C.	Sanyo	

Diodes

⚠	Item	Part Number	Description		Areas
				Maker	
	D501	1SS133	Silicon	Rohm	
	D502	1SS133	Silicon	Rohm	
	D503	1SS133	Silicon	Rohm	
	D504	1SS133	Silicon	Rohm	
	D505	1SS133	Silicon	Rohm	
	D506	1SS133	Silicon	Rohm	
	D507	SLR-34DC50F	L.E.D.	Rohm	
	D508	SLR-34VC50F	L.E.D.	Rohm	
	D509	SLR-34DC50F	L.E.D.	Rohm	
	D510	SLR-34DC50F	L.E.D.	Rohm	
	D511	SLR-34VC50F	L.E.D.	Rohm	

Capacitors

⚠	Item	Part Number	Description			Areas
	C501	QET61HM-475	4.7 μF	50 V	Electro	
	C502	QET61HM-475	4.7 μF	50 V	Electro	
	C503	QET51CM-227	220 μF	16 V	Electro	
	C504	QET51VM-107	100 μF	35 V	Electro	

Resistors

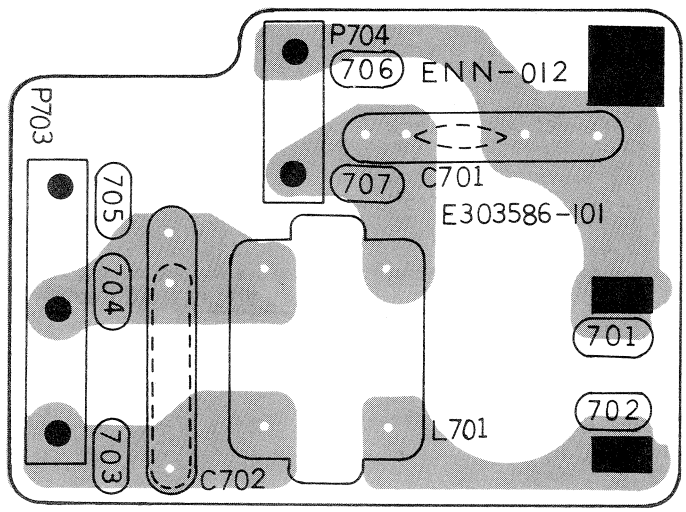
⚠	Item	Part Number	Description			Areas
	R503	QRD161J-331	330 Ω	1/6 W	Carbon	
	R504	QRD161J-331	330 Ω	1/6 W	Carbon	
	R505	QRD161J-331	330 Ω	1/6 W	Carbon	
	R506	QRD161J-331	330 Ω	1/6 W	Carbon	
	R507	QRD161J-331	330 Ω	1/6 W	Carbon	
	R513	QRD161J-183	18 kΩ	1/6 W	Carbon	

Others

⚠	Item	Part Number	Description	Areas
	FL501	ELU0001-025	FL Tube	
	SW501	ESP0001-008	Push Switch	
	SW502	ESP0001-008	Push Switch	
	SW503	ESP0001-008	Push Switch	
	SW504	ESP0001-008	Push Switch	
	SW505	ESP0001-008	Push Switch	
	SW506	ESP0001-008	Push Switch	
	SW507	ESP0001-008	Push Switch	
	SW508	ESP0001-008	Push Switch	
	SW509	ESP0001-008	Push Switch	
	SW510	ESP0001-008	Push Switch	
	SW511	ESP0001-008	Push Switch	
		E11051-101	Circuit Board	

5-(4) ENN-012 □ Primary P.C. Board Ass'y

Note: ENN-012 □ Varies according to the areas employed. See note (1) when placing on order.



Note (1)

P.C. Board Ass'y	Designated Areas
ENN-012 A	U.S.A.
ENN-012 B	U.S. Military Market & Other Countries
ENN-012 C	Europe
ENN-012 D	U. K.
ENN-012 F	Canada

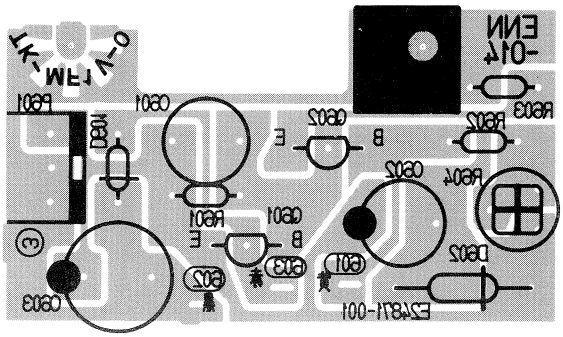
Capacitors

⚠	Item	Part Number	Description		Areas
	C701	QFZ9020-103	0.01 μF	M.Mylar	B
	C701	QFZ9020-103	0.01 μF	M.Mylar	C
	C701	QFZ9020-103BS	0.01 μF	M.Mylar	DBS
	C701	QCZ9019-103	0.01 μF	Ceramic	A
	C702	QFZ9019-223	0.022 μF	M.Film	A
	C702	QFZ9020-223	0.022 μF	M.Mylar	B
	C702	QFZ9020-223	0.022 μF	M.Mylar	C
	C702	QFZ9020-223BS	0.022 μF	M.Mylar	DBS

Others

⚠	Item	Part Number	Description	Areas
	L701	ENZ5002-003BS	Line Filter	DBS
	L701	ENZ5002-003	Line Filter	A
	L701	ENZ5002-003	Line Filter	B
	L701	ENZ5002-003	Line Filter	C
	T701	E65508-002	Tab	
	T703	E67764-203	Terminal Ass'y	
	T704	E67764-202	Terminal Ass'y	
		E303586-101	Circuit Board	A
		E303586-101	Circuit Board	B
		E303586-101	Circuit Baord	C
		E303586-101BS	Circuit Board	DBS

5-(5) ENN-014A APC (Auto Power Control) P.C. Board Ass'y



Transistors

⚠	Item	Part Number	Description		Areas
				Maker	
	Q601	2SC2120(O,Y)	Silicon	Toshiba	
	Q602	2SA1029(C,D)	Silicon	Hitachi	

Diodes

⚠	Item	Part Number	Description		Areas
				Maker	
	D602	LTZ-R15HX	Silicon	Rohm	

Capacitors

⚠	Item	Part Number	Description			Areas
	C601	QCZ0202-155	1.5 μF		Mylar	
	C602	QET61AM-227	220 μF	10 V	Electro	
	C603	QET61AM-227	220 μF	16 V	"	

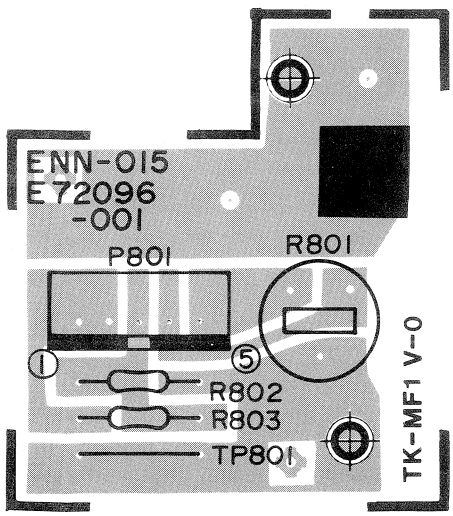
Resistors

⚠	Item	Part Number	Description			Areas
	R601	QRD161J-103	10 kΩ	1/6 W	Carbon	
	R602	QRD161J-182	1.8 kΩ	1/6 W	Carbon	
	R603	QRD161J-102	1 kΩ	1/6 W	Carbon	
	R604	QVZ3513-223	22 kΩ		Variable	

Others

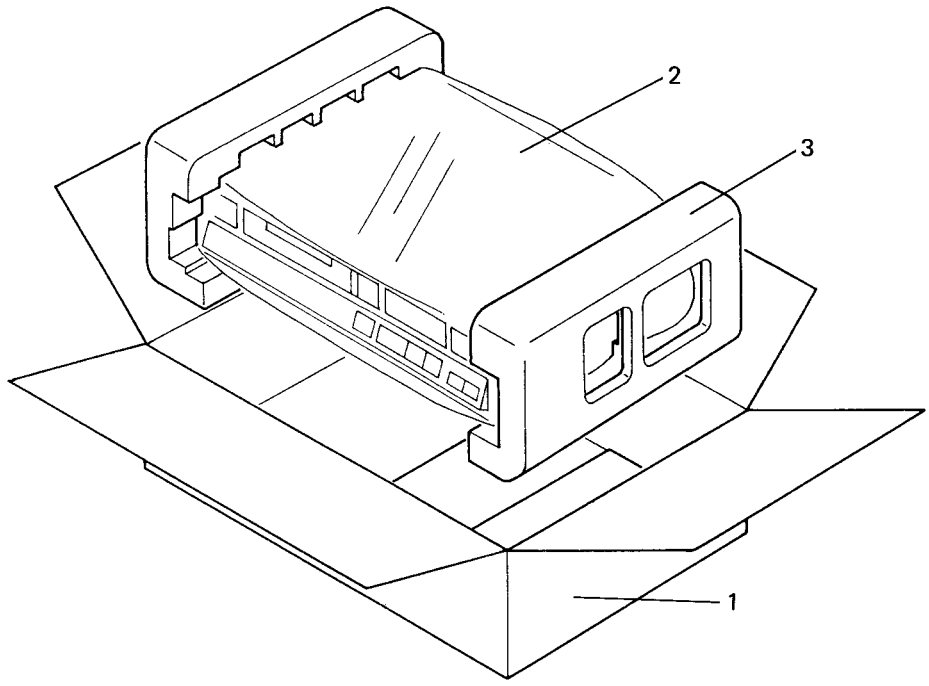
⚠	Item	Part Number	Description	Areas
		EMV5103-003A	3P Plug Ass'y	
		E24871-001	Circuit Board	

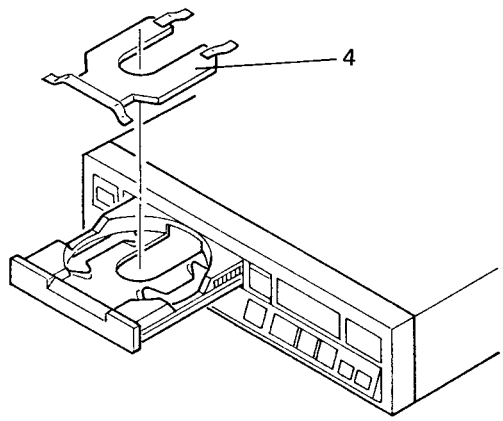
5-(6) ENN-015A Mirror offset P.C. Board Ass'y



⚠	Item	Part Number	Description			Areas
	R801	QVP4A0B-223	22 kΩ	0.1 W	Variable	
	R802	QRD148J-273S	27 kΩ	1/4 W	Carbon	
	R803	QRD148J-102S	1 kΩ	1/4 W	Carbon	
	P801	QMV5005-005			Plug	
	TP801	E03719-10.0			Bus Wire	
		E72096-001			Circuit Board	

6. Packing Materials and Part Numbers





Item	Part Number	Part Name	Description	Areas
1	PK-XLV300E	Packing Case	Silver	Except ES
	PK-XLV300BE	Packing Case	Black	Except ES
	PK-XLV300EES	Packing Case	Silver	ES only
	PK-XLV300BEES	Packing Case	Black	ES only
2	E300196-047	Envelope		Except BS
	E300196-047B	Envelope		BS only
3	NZ-XLV300E	Packing Pad		
4	E71970-001	Spacer		

The Marks for Designated Area

J . . . . . U.S.A.
C . . . . . Canada
A . . . . . Australia
E . . . . . Europe
G . . . . . West Germany
ES . . . . . Spain
BS . . . . . U.K.
P, PG . . . . . U.S. Military Market
U . . . . . Other Countries
No mark indicates all areas

7. Accessories List

⚠	Part Number	Part Name	Description	Areas
	E30580-1217A	Instruction Book		Except BS
	E30580-1217ABS	Instruction Book		BS only
	BT20047B	Warranty Card		J.P. PG
	BT20025G	Warranty Card		C
	BT20029C	Warranty Card		A
	BT20060	Warranty Card		BS
	BT20064	Warranty Card		G
	BT20044D	Safety Instruction Book		J
	BT20046B	Service Information Card		J.P.PG
	BT20071	SVC Center List		C
	BT20066	EEC Agency		BS, G
	E70570-001	Keeping Card (1)	for Laser	J
	E70571-001	Keeping Card (2)	for Laser	J
	E70572-001	Keeping Card (3)	for Laser	J
	A76332-2	Keeping Card		J
	E35497-017	Caution Sheet	for Line Voltage	P
	E35497-019	Caution Sheet	for Line Voltage	U, PG
⚠	E04056	Siemens Plug		U, PG
	EWP302-101	Signal Cord		
	E66416-003	Envelope	for Warranty Card	J
	E41202-2	Envelope		Except BS
	E41202-2B	Envelope		BS only

⚠ : Safety Parts

The Marks for Designated Area

J . . . . . U.S.A.
C . . . . . Canada
A . . . . . Australia
E . . . . . Europe
G . . . . . West Germany
ES . . . . . Spain
BS . . . . . U.K.
P, PG . . . . . U.S. Military Market
U . . . . . Other Countries
No mark indicates all areas

Laser Caution

1. **CLASS 1 LASER PRODUCT**
2. **DANGER:** Invisible laser radiation when open and interlock failed or defeated. Avoid direct exposure to beam.
3. **CAUTION:** Do not open the top cover. There are no user serviceable parts inside the unit; leave all servicing to qualified service personnel.
4. **CAUTION:** The compact disc player uses invisible laser radiation and is equipped with safety switches which prevent emission of radiation when the drawer is open and the safety interlocks have failed or are defeated. It is dangerous to defeat the safety switches.
5. **CAUTION:** Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
6. **CAUTION:** The laser is able to function, if safety switches are out of function. The laser light is invisible, avoid exposure, do not disassemble the laser unit, but replace the complete unit.

VARNING: OSYNLIG LASERSTRÅLNING UPPSTÅR VID KOMPONENTENS ÖPPNING NÄR SÄKERHETSBRYTAREN ÄR FRÅNSLAGEN.

VAROITUS: VARMUUSKYTKIMEN OLLESSA POIS PÄÄLTÄ KUN LAITE AVATAAN, SIELLÄ KEHITTYY NÄKYMÄTÖNTÄ LASERSÄTEILYÄ. ÄLÄ PANE ITSEÄSI SÄTEILYN ALTIIKSI.

ADVARSEL: USYNLIG LASERSTRÅLING VED ÅBNING, NÅR SIKKERHEDSAFBRYDERE ER UDE AF FUNKTION. UNDGÅ UDSÆTTELSE FOR STRÅLING.

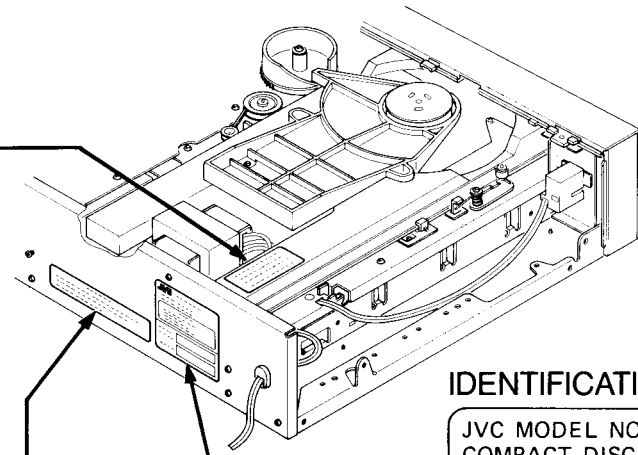
ADVARSEL: USYNLIG LASERSTRÅLING VED ÅPNING NÅR SIKKERHETSBRYTEREN ER AVSLOTT. UNNGÅ UTSETTELSE FOR STRÅLING.

(FOR U.S.A. ONLY)

LASER CAUTION LABEL

DANGER – Invisible laser radiation when open and interlock failed or defeated. AVOID DIRECT EXPOSURE TO BEAM

(LABEL LOCATED INSIDE THE UNIT – DO NOT OPEN)



IDENTIFICATION LABEL

JVC MODEL NO. XL-V300
COMPACT DISC PLAYER
AC 120 V~ 60 Hz 17 W

US JVC CORP.
41 SLATER DRIVE ELMWOOD PARK, N.J. 07407
MANUFACTURED AT Y.P.
MADE IN JAPAN

MANU-FACTURED *1
SERIAL NO. *2

NOTE
(*1) : STAMP THE DATE OF MANUFACTURE
(*2) : STAMP THE SERIAL PRODUCTION NUMBER

CERTIFICATION LABEL

CERTIFICATION
THIS PRODUCT COMPLIES WITH DHHS RULES 21 CFR SUBCHAPTER J APPLICABLE AT DATE OF MANUFACTURE.

1. Specifications

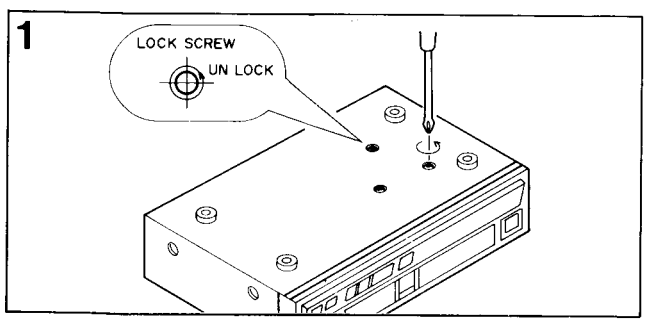
System	: Compact disc player
Signal detection system	: Non-contact optical system pickup
Number of channels	: 2 channels
Frequncy response	: 5 Hz – 20,000 Hz (within $^{+0.3}_{-0.8}$ dB)
Dynamic range	: 95 dB (1 kHz)
Signal/noise ratio	: 96 dB
Channel separation	: 90 dB (1 kHz)
Harmonic distortion	: 0.0035 %
Wow and flutter	: Less than measurable limit
Output level	: 2.0 Vrms (full scale)
Numer of program steps	: 8 steps
Weight	: 5.0 kg (11.0 lbs.)
Dimensions	: 435(W) x 92(H) x 294(D) mm (17-3/16" x 3-5/8" x 11-5/8")
Accessory	: Signal cord

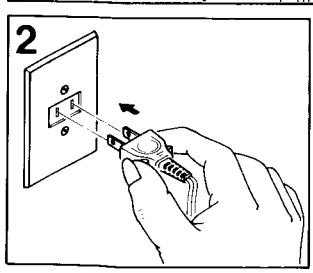
POWER SPECIFICATIONS

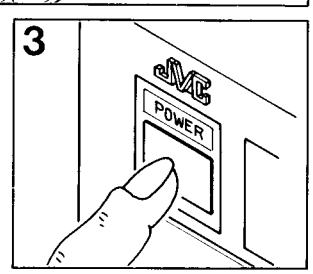
Areas	Line Voltage & Frequency	Power Consumption
U.S.A.	AC 120 V∿, 60 Hz	17 watts
Canada		
Continental Europe	AC 220 V∿, 50 Hz	
U.K.	AC 240 V∿, 50 Hz	
Australia		
Other areas	AC 110/120/220/240 V∿ selectable, 50/60 Hz	

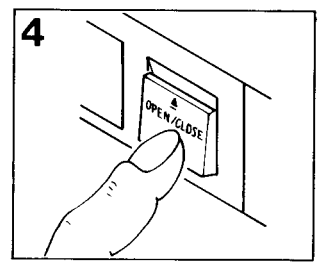
2. Before Use

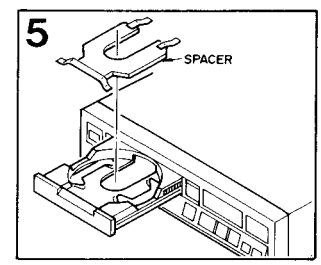
1. Loosen the three shipping screws on the bottom using a screwdriver until they disengage. (Turn about 5 – 10 turns.)
2. Connect the power plug to the wall outlet.
3. Press the POWER button.
4. Press the OPEN/CLOSE ⏏ button to move the disc platter out.
5. Take off the shipping spacer on the disc platter.
6. Then, press the OPEN/CLOSE ⏏ button to move the disc platter in.

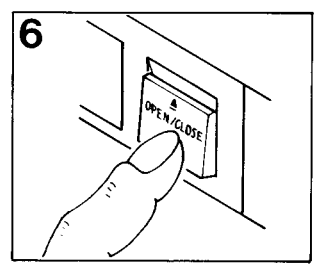








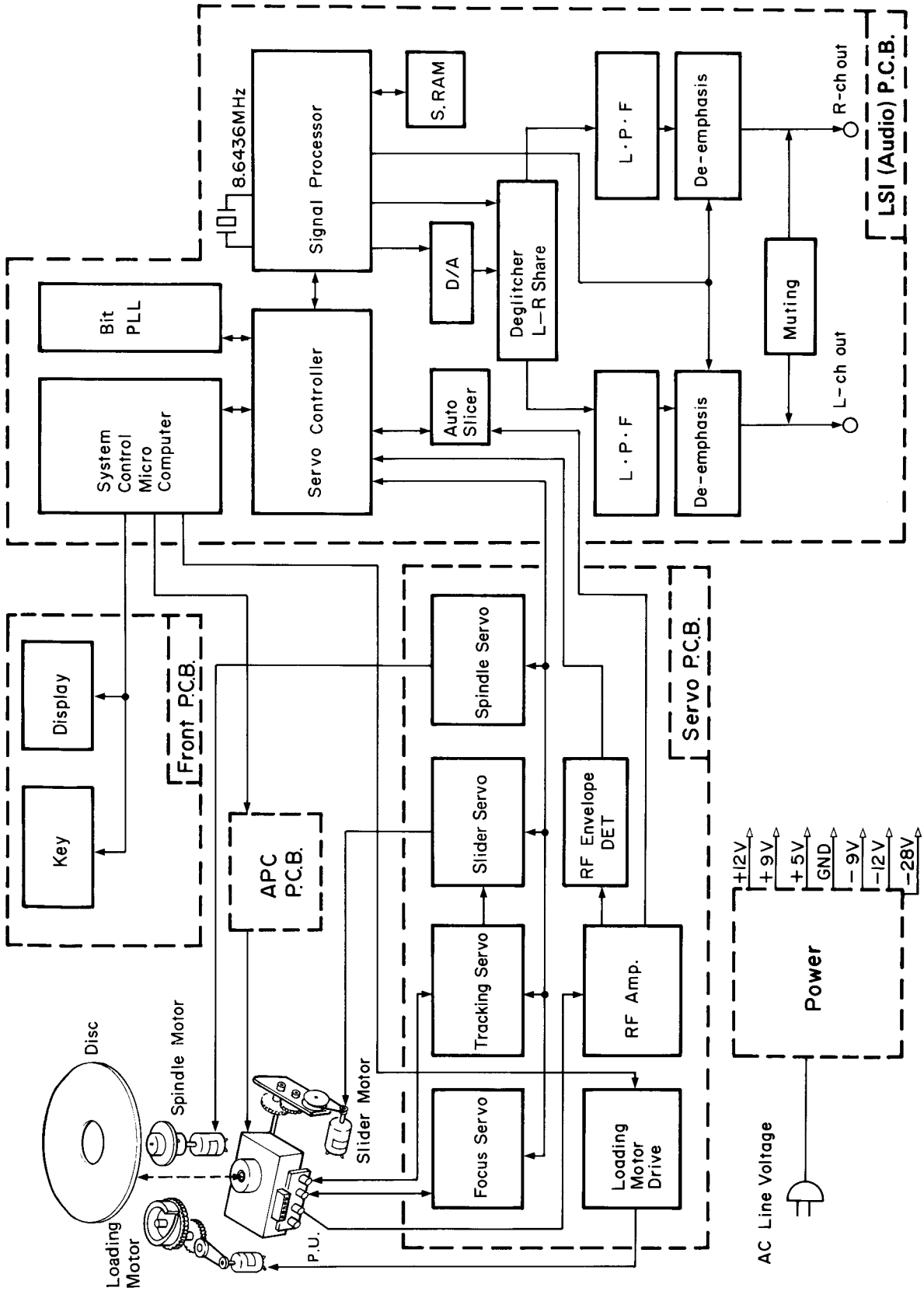




Procedures for reassembling

1. Press the OPEN/CLOSE ⏏ button to move out the disc platter.
2. Fix the shipping spacer using tape.
3. Press the OPEN/CLOSE ⏏ button to move in the disc platter.
4. Press the POWER button to switch off the power supply.
   Note: In this case, do not press the POWER button repeatedly to switch on and off at too short intervals because the position of pickup may slip slightly and fixing the pickup with the shipping screws may be impossible.
5. Secure the three shipping screws. (Fastening torque: 4 – 5 kg)

3. Schematic Block Diagram



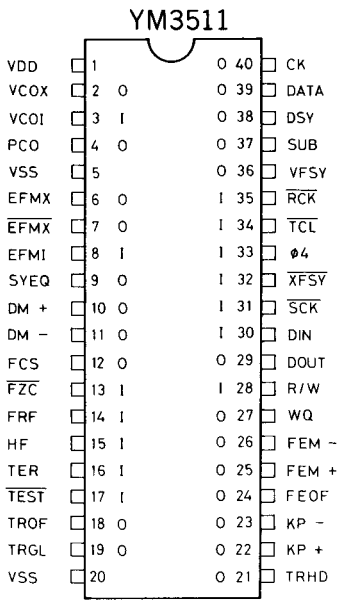
4. Description of Major LSI ICs

4-(1) YM3511(IC102)

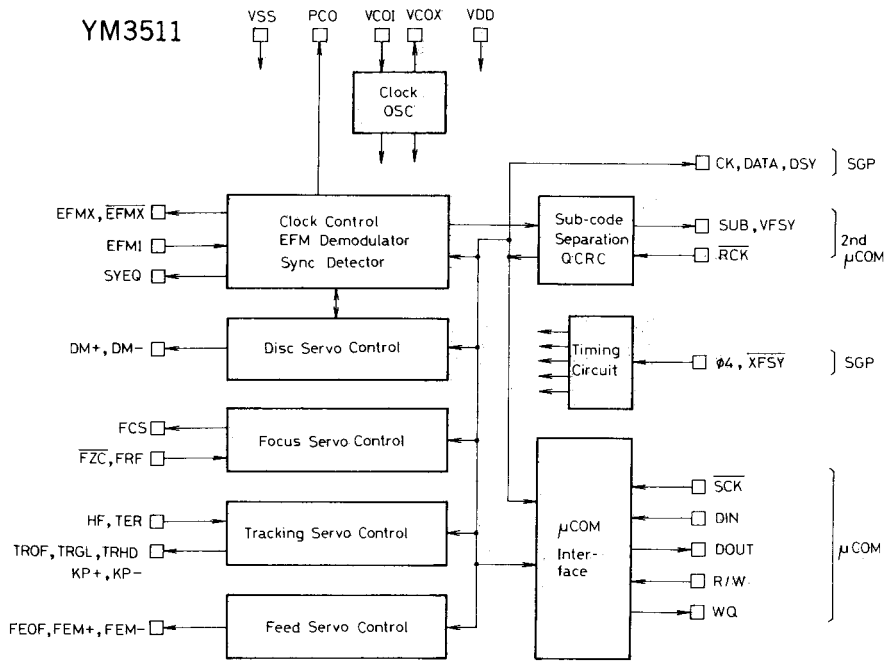
Outline: YM3511 is a silicon-gate CMOS LSI for CD player servo-control used with YM2201(SGP) for demodulation of EFM signal from photo pickup and various intelligent servo-control functions (focus, disc, tracking, field).

Function: 1) Digitizes EFM signal, performs clock regeneration and separates synch signal.
2) EFM demodulates the digital signal described above and outputs it to YM2201(SGP).
3) Separates Q sub code from the digital signal described above and outputs it to the external microprocesser after CRC checking.
4) Outputs frame phase difference signal from regenerated and standard clocks and controls speed of disc motor.
5) Performs tracking and feed servo controls for music scanning and fast forward by input of commands from microprocessor.

Terminal layout



Block diagram



Description of terminal functions

1) EFM signal external circuit ⑧EFMI, ⑦$\overline{\text{EFMX}}$, ⑥EFMX
Inputs signal with optimum level (1 – 2 Vpp) from photo pickup to EFMI terminal and mutually opposite phase signal with limited amplitude is generated from $\overline{\text{EFMX}}$ and EFMX. Controls slice level.
2) Clock regeneration circuit ④ PCO, ③ VCOI, ② VCOX
Performes clock oscillation (8.6436 MHz on average) when LC resonance circuit is connected between VCOI and VCOX. Output from PCO terminal is phase difference output at polarity change of clock and EFM pattern and can regenerate clock by setting the polarity of variable capacity diode so that the frequency is increased when positive.
3) Synchronization coincidence signal ⑨ SYEQ
Output terminal for checking; becomes "H" when synchronizing signal detected from EFM pattern and that of internal counter are coincident.
4) Signal to SGP ㊵ CK, ㊴ DATA, ㊳ DSY
CK is clock of 4.3218 MHz on average and the frequency of the VCO is divided by two. DATA is serial signal with bit rate of this clock and contains 8-bit EFM demodulation signal and 5-bit data control signal. DSY is synchronizing signal which becomes "H" with timing coinciding with the first signal.
These three signals are connected to SGP.
5) Sub code output ㊲ SUB, ㊱ VFSY, ㉟ $\overline{\text{RCK}}$
VFSY is synchronizing output combining frame and sub code frame (98-frame). By determining the change from "H" to "L" of this signal externally and sending clock 8 times to RCK terminal, it is possible to take out sub code P – W from SUB output terminal in serial bits.

6) Signal from SGP ㉝ ϕ4, ㉜ XFSY
Input terminal to be connected to SGP. ϕ4 is a 4.3128 MHz crystal clock and XFSY is a 7.35 kHz frame synchronizing signal.

7) Q code output ㉗ WQ, ㉘ R/W, ㉙ DOUT, ㉛ $\overline{SCK}$

Detail of DOUT

Internal state	
CONT	ADR
TNO	
INDEX	
MIN	
SEC	
FRAME	
P-CODE	
AMIN	
ASEC	
AFRAME	

MSB							LSB
SIGN	S2	S1	8F	4F	MZ	FCO	NQ

SIGN: Search polarity
S2, S1: Search mode
8F, 4F: Frame error
MZ: Disc motor stops
FCO: Focus out
NQ: New Q code

It is possible to take out the above data to DOUT in bit serial by detecting "H" of WQ by μCOM and sending $\overline{SCK}$.
This finishes by setting R/W once to "H" after sending out $\overline{SCK}$ clock.

8) μCOM command ㉘ R/W, ㉚ DIN, ㉛ $\overline{SCK}$

Detail of DIN

Command
μMIN
μSEC
μFRAME

MSB							LSB
M4	M3	M2	M1	T4	T3	T2	T1
Instruction				Test			

The above data is input by synchronizing and sending out $\overline{SCK}$ clock and DIN after setting R/W to "H" by μCOM. For instruction except for 7, 1 byte is input and when it is 7, 4 bytes are input.

9) Focus servo Input: ⑬ $\overline{FZC}$, ⑭ FRF, Output: ⑫ FCS
These terminals are used for input of focus servo. FCS signal is a signal to input forcus. When focus point has been reached, the lead-in function stops if $\overline{FZC}$ signal is generated and the FCO flag is disabled internally by the FRF signal having detected the reflected ray.

10) Disc servo ⑩ DM+, ⑪ DM-
DM+ and DM- are PWM output of one frame (7.35 kHz) cycle. DM+ and DM- cannot be set to "H" at the same time. In stable conditions during PLAY, they have the resolving-power of 1/47 of one frame i.e. 9.25 ns.

11) Tracking servo Input: ⑮ HF, ⑯ TER
Output: ⑱ TROF, ⑲ TRGL, ㉑ TRHD, ㉒ KP+, ㉓ KP-
Samples the change of amplitude of HF signal generated when traversing the track during search at the zero cross point of tracking error signal TER and outputs TROF signal. Correction of track becomes easy because servo is switched on and off by the change of the signal level. Outputs TRHD while outputting KP+ and KP- for tracking and holds tracking error signal.

12) Feed servo ㉔ FEOF, ㉕ FEM+, ㉖ FEM-
FEM+ or FEM- signal is output as the high-speed feed signal. During this time, FEOF signal is output to cut the feed servo.

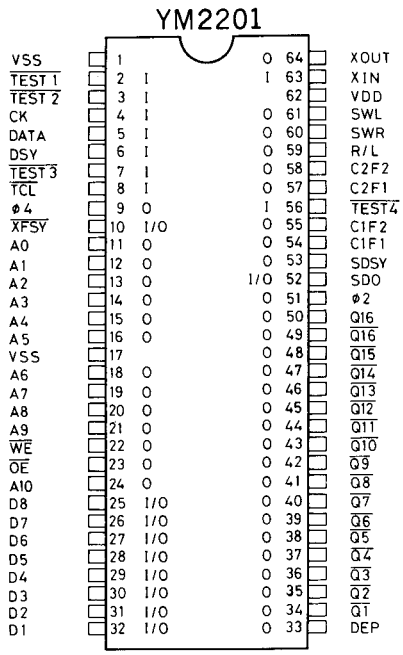
13) Test terminal ⑰ TEST, ㉞ TCL
Terminal for testing which is normally "H" by internal pull-up resistor. Not connected.

4-(2) YM2201(IC103)

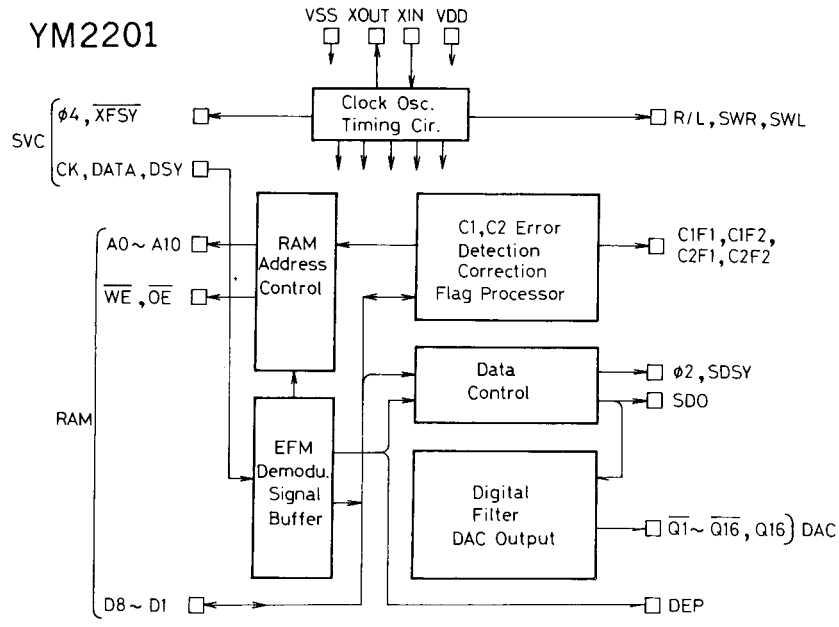
Outline: YM2201 is (SGP) N channel silicon gate MOS LSI for signal processor in CD player.
Performs digital filtering for correction of digital signal and improvement of sound quality; used with YM3511(SVC).

Function: 1) Generates standard clock oscillations and timing signals necessary for operation with external crystal oscillator.
2) Performs buffering of EFM demodulation signal for absorbing fluctuation in disc speed and exchanges signals with external RAM.
3) Unscrambles and deinterleaves by re-sequencing digital signal from YM3511(SVC) into a fixed sequence.
4) Performs the detection and correction of error signals and flag processing (double error correction system).
5) Performs signal interpolation, pre-hold and muting etc.
6) Performs digital filtering (signal cutoff at 20 kHz) by doubling the sampling cycle for each channel L and R to 88.2 kHz and outputs signal for DAC.

Terminal layout



Block diagram



Description of terminal functions

1) Clock oscillation ⑥③ XIN, ⑥④ XOUT
   Performs oscillation by connecting 10 pF capacitor between GND terminals and crystal oscillator (8.6436 MHz) between terminals.
2) Synchronizing signal to SVC ⑨φ4, ⑩ $\overline{XFSY}$
   Outputs clock of 4.3218 MHz and synchronizing signal of 7.35 kHz to SVC.
3) Signal from SVC ④ CK, ⑤ DATA, ⑥ DSY
   Connect to the SVC output. They are the VCO clock (4.3218 MHz on avarage), EFM demodulation + data control signal and synchronizing signal.
4) RAM connection ⑪ AO – ㉔ A10, ㉒ $\overline{WE}$, ㉓ $\overline{OE}$, ㉕ D8 - ㉜ D1
   They are respectively address, input/output control signal and data signal to be connected to the RAM terminals.
   SGP is in output configuration with $\overline{WE}$="L" and in input configuration with $\overline{WE}$="H".
5) C1 and C2 error correction check signals ⑤④ C1F1, ⑤⑤ C1F2, ⑤⑦ C2F1 and ⑤⑧ C2F2
   Terminals for checking to determine the function conditions of C1 and C2 error correction circuits.

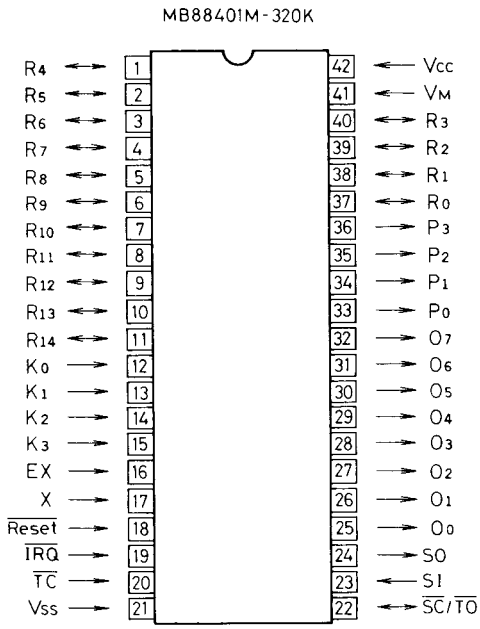
C1/C2	F2	F1
No error	0	0
One error	0	1
Double error	1	0
Impossible to correct	1	1

6) Data control circuit: serial signal output ⑤① φ2, ⑤② SDO, ⑤③ SDSY, ⑤⑥ $\overline{TEST\ 4}$
   φ2 is 2.1609 MHz crystal clock.
   SDO is serial output signal, LCH 24-bit, RCH 25-bit and LSB for DAC at φ2 bit rate.
   When $\overline{TEST\ 4}$ is normally "H", SDO is in output condition. When it is set to "L", input to the digital filter is possible using the same format.
   $\overline{SDSY}$ is synchronizing signal and when SDO is LCH, it is "H"; it is "L" for RCH.
7) Parallel DAC output signals ㉞ $\overline{Q1}$ – ㊾ $\overline{Q16}$, ⑤⓪ Q16, ⑤⑨ R/L, ⑥⓪ SWR, ⑥① SWL
   Parallel output signals for DAC. Data rate is 88.2 kHz for each channel after signals have been digitally filtered, (band suppression of 44.1 ±20 kHz), LCH and RCH in order.
   It is possible to conform to two's complement DAC by using $\overline{Q16}$ and to DAC of offset binary by using Q16.
   R/L is a signal for distribution of DAC analog outputs; when "H" is RCH, SWR, SWL are signals for deglitching each channel.
8) De-emphasis signal ⑥③ DEP
   De-emphasis is necessary when the frequency characteristic control signal is "H".
9) Test terminals ② $\overline{TEST\ 1}$, ③ $\overline{TEST\ 2}$, ⑦ $\overline{TEST\ 3}$, ⑧ $\overline{TCL}$
   Terminals for tests which are normally "H" by internal pull-up resistors. Not connected.

4-(3) MB88401M-320K(IC101)

Outline: NMOS 4-bit microcomputer with 4 KB ROM, the main functions of which are to accept signals from switches, display FL and LED indications and command other LSI chips to operate.

Terminal layout

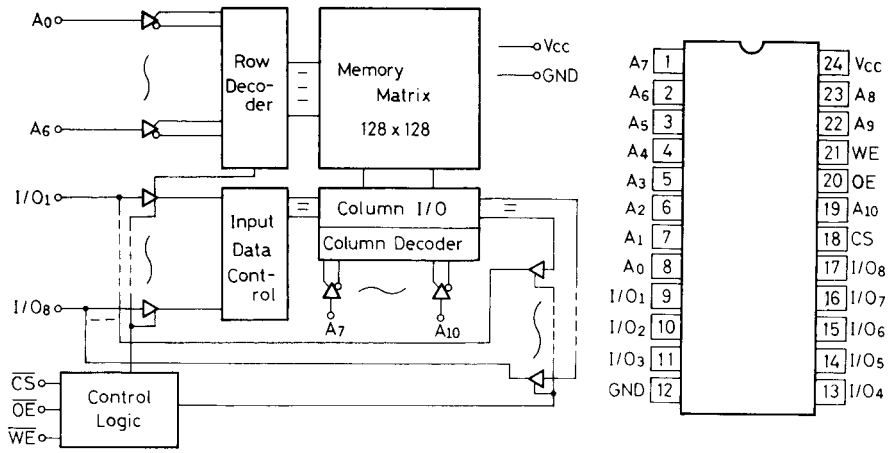


Terminal and function

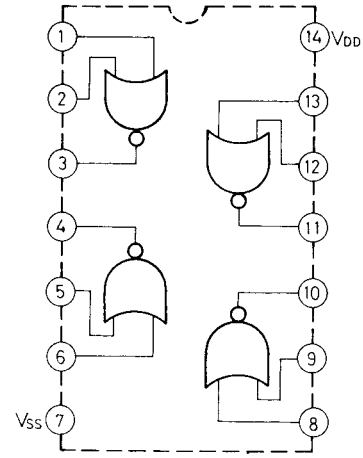
Pin No.	Pin Name	Description
1	R4	• Scan signal output for display (FL) driving and key input. (3-bit decoded, positive logic, "111 — output OFF)
2	5	
3	6	
4	7	• Setting operation when POWER ON. (Auto play function = L (switch on))
5	8	• Individual signal output for display (LED)
6	9	
7	10	
8	11	• Segment signal output for display (FL "MIN. SEC")
9	12	• Signal input for detection of loading condition (Closed = L) (Open = L)
10	13	
11	14	• Signal input for detection of slider condition (Loading position = L)
12	K0	• Key switch matrix input for operation (Key pressed in = L)
13	1	
14	2	• Pull up (+5 V)
15	3	• Q code signal ready output (Ready = H)
16	EXtal	• External circuit connection terminals for clock generator (4.19 MHz)
17	Xtal	
18	$\overline{\text{RESET}}$	• Input terminal for initializing MPU operation (Reset = L)
19	$\overline{\text{IRQ}}$	• Pull up (+5 V)
20	$\overline{\text{TC}}$	• Pull up (+5 V)
21	Vss	• GND
22	$\overline{\text{SCK}}$	• Shift clock for serial data transfer (to YM3511).
23	SI	• Serial data (Q code data) input terminal
24	SO	• Serial data (command data) output terminal
25	O0	• Segment signal outputs for display (FL)
26	1	
27	2	
28	3	
29	4	
30	5	
31	6	
32	7	
33	P0	• Signal outputs for loading control (Closed = H) (Open = H)
34	1	
35	2	• Signal output for laser control (ON = L)
36	3	• Signal output for spindle servo control (BRAKE = L)
37	R0	• Signal output for YM3511 control
38	1	• Signal output for DCS control (PLAY = L)
39	2	• Individual signal output for display (LED)
40	3	
41	VM	+5 V
42	Vcc	+5 V

5. Other LSI ICs and Internal Block Diagrams of ICs

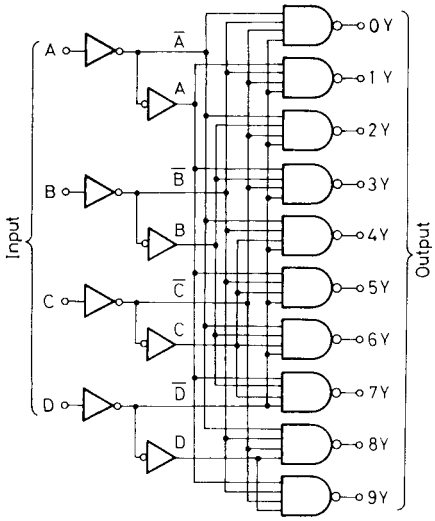
■ **HM6116AP-15 (High Speed Static C-MOS RAM)**

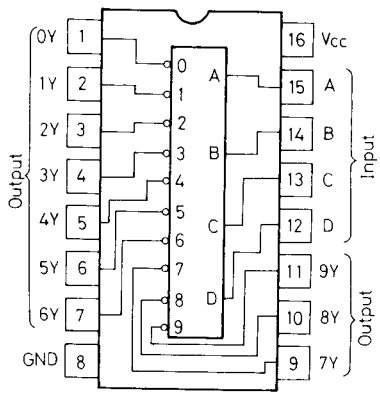


■ **TC4001BP (Dual Input NOR Gates)**

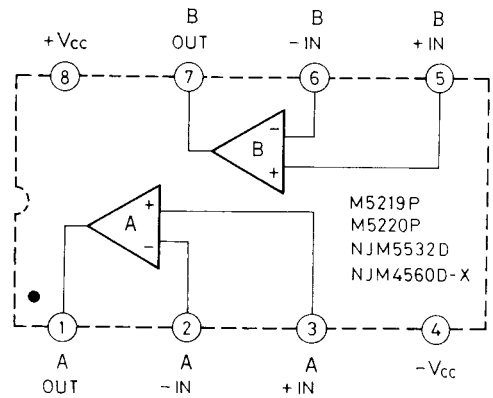


■ **HD74LS42P (BCD-to-Decimal Decoder)**

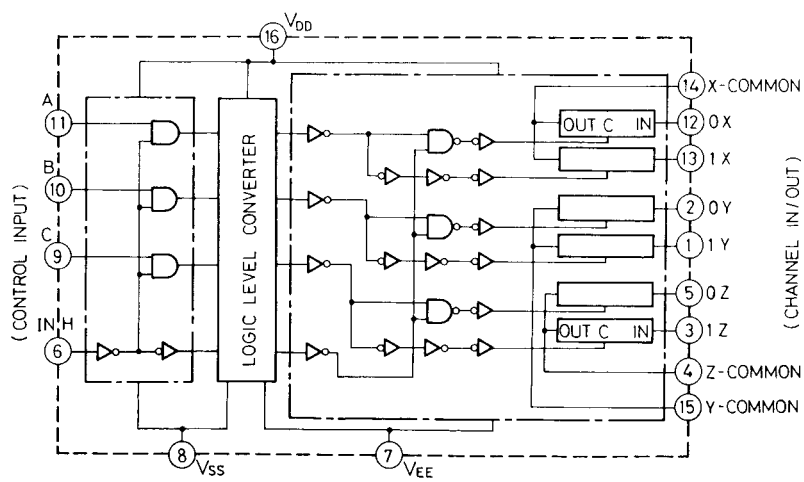




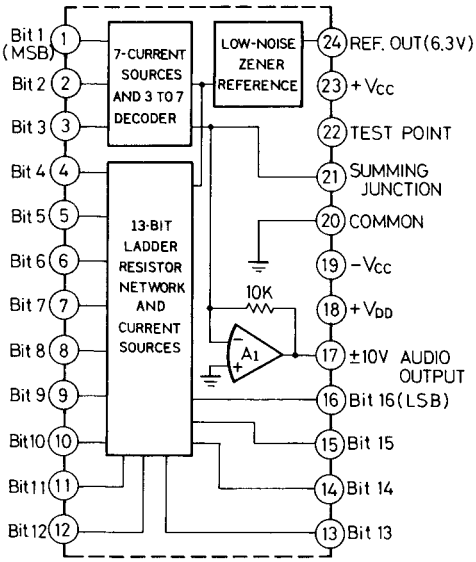
■ **M5219P/M5220P**
■ **NJM5532D/NJM4560D-X (OP Amp.)**



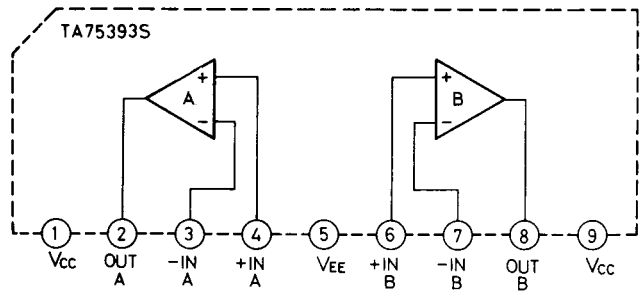
■ **TC4053BP (Analog Switch)**



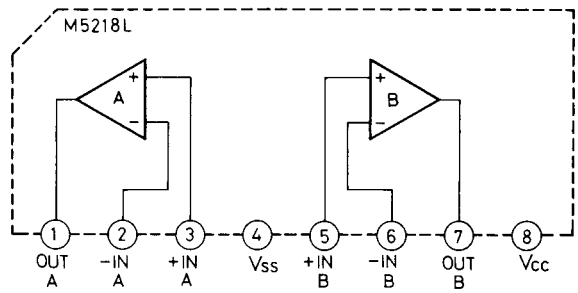
■ PCM53JP-V (D/A Converter)



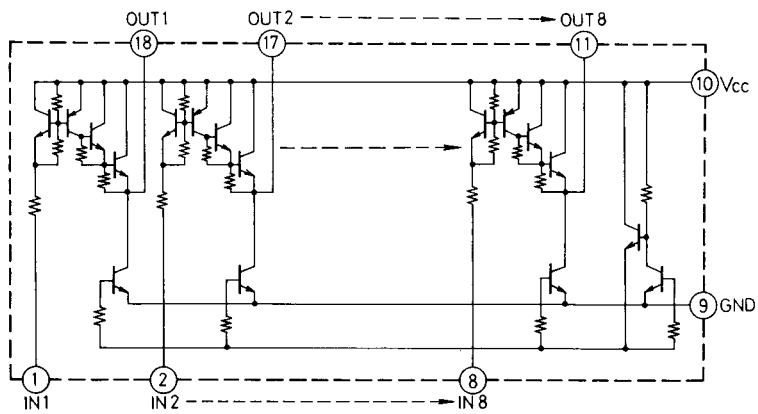
■ TA75393S (Comparator)



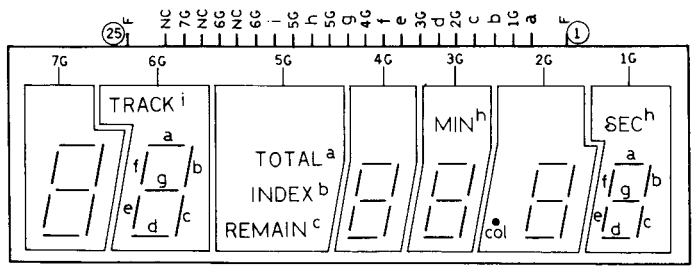
■ M5218L (OP Amp.)



■ LB1240 (Transistor Array)



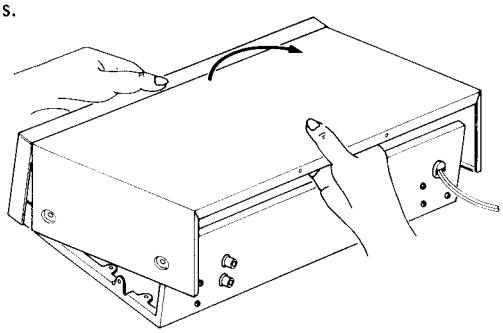
■ ELU0001-025 (FL Display Tube)



6. Disassembly Procedures

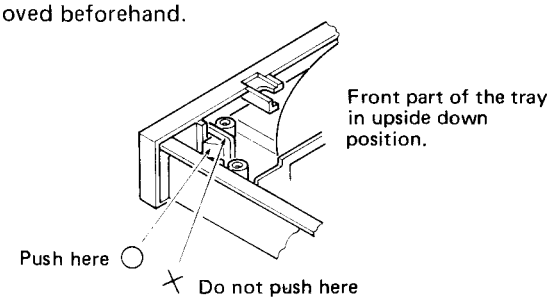
6-(1) Removal of the metal cover

1. Remove 6 fixing screws.
2. Lift the rear portion of the metal cover by 1/2 the height of the rear panel.
3. While pressing the front panel upper portion slightly with one hand (so that the unit is not lifted up), hold the rear portion of rear panel and remove it upward by turning it in direction of arrow while pulling it backwards.



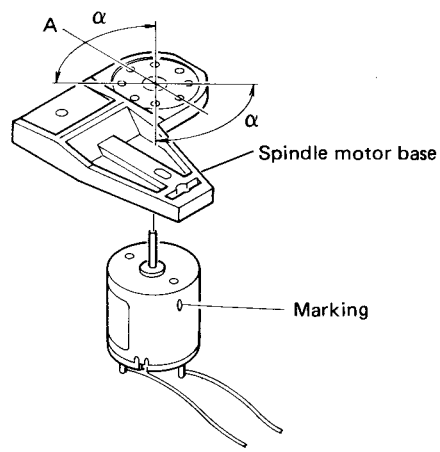
6-(2) Removal of loading assembly

1. Remove the window of the tray by taking out two click stoppers after moving the tray out towards you. In this case, make sure to press the center of the click stopper. If the outside of the click stopper is pressed, the click stopper may be damaged.
2. It is possible to remove the loading assembly without removing the front panel if the window has been removed beforehand.



6-(3) Notes when replacing the spindle motor

A marking showing the direction of spindle inclination is provided on the spindle motor. When installing the motor on the spindle motor base, align this marking with center line "A". If this marking does not match center line"A", be sure to set it at least in range of angle α.

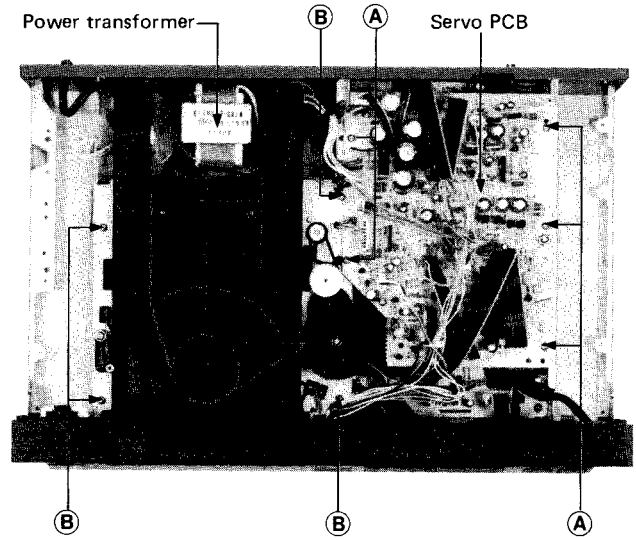


6-(4) Removal of servo PCB

After removing the metal cover, remove 5 screws Ⓐ holding the servo PCB.

6-(5) Removal of loading assembly

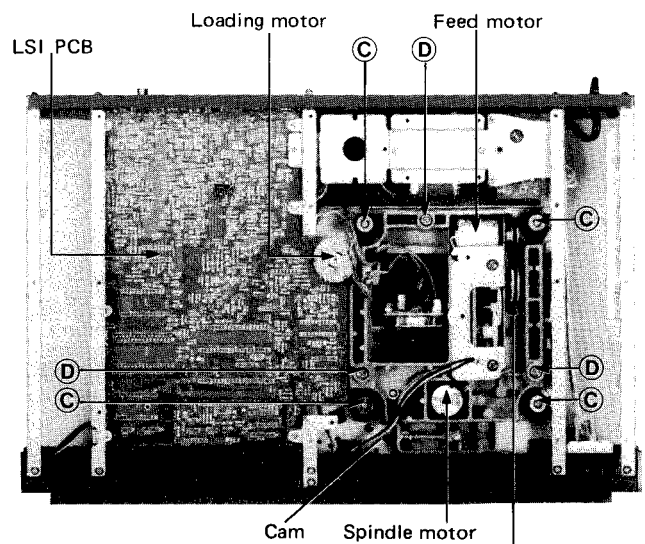
After removing the servo PCB, remove 4 screws Ⓑ holding the loading assembly.



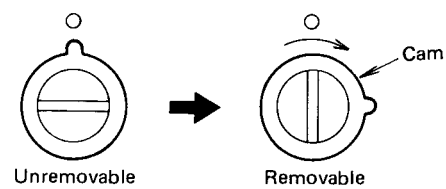
6-(6) Removal of mechanical feed assembly

Remove the 19 screws from the base of the unit holding the bottom plate.

After removing the bottom plate, remove 4 screws Ⓒ holding the mechanical feed assembly. (In this case, make sure that 3 screws Ⓓ are loosened.)



Turning the cam 90° clockwise as shown below and loosing the screw under the pulley allow you to pull out the tray assembly towards the front panel.



7. Application Points for Grease and Adhesive

Grease

Item	Points to apply grease
G-501 (Shinetsu-kagaku)	• Fitting portion of feed shaft and bushing. • Sliding portion of right edge of PU base and upper side of floating base.
G311S (Kanto-kasei)	• Feed gear engagement portion • Bearing portions of 4 rollers of base assembly in loading section. • Engagement portion of pulley and sub-gear in loading section. • Top of cam on the upper side of main gear in loading section. • Spindle portions of sub-gear, pulley and main gear in loading section.

Adhesive

Item	Points to apply adhesive
Screw lock 1401B (Three bonds)	• 2 screws fixing the spindle motor • Adjustment nut of spindle motor base (After adjusting of grating)

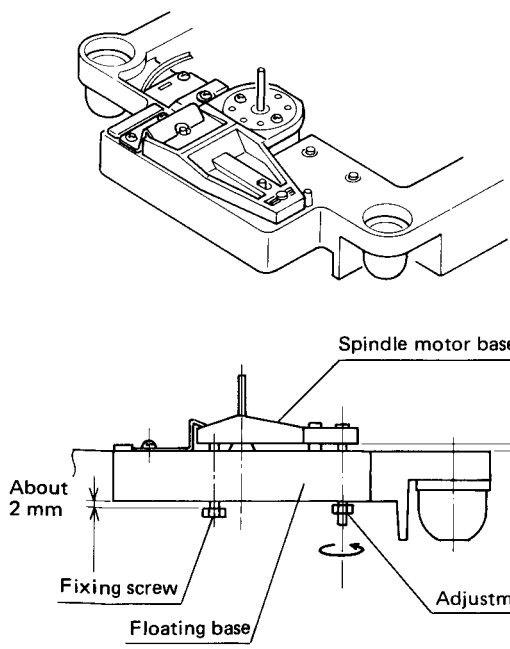
Note: If the specified greases and adhesives are not available, consult your nearest JVC dealer.

8. Adjustment Procedure (Mechanical Adjustments)

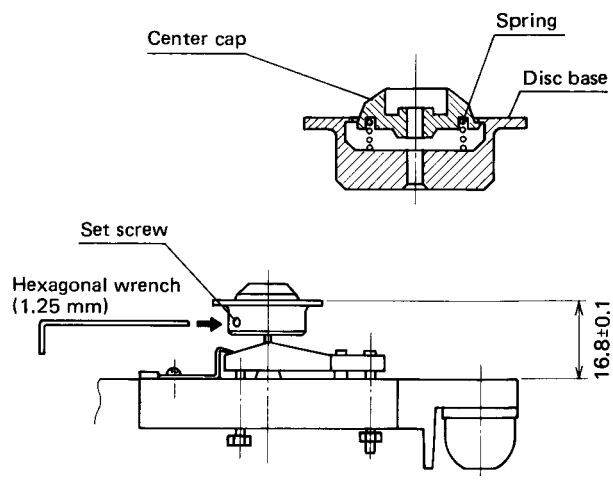
Be sure to perform this adjustment before electric adjustment.

8-(1) Installation of disc base

1. Horizontal adjustment of spindle motor base



Turn the adjustment nut so that interval C between the spindle motor base and floating base is uniform (visual measurement is OK).
In this case, move the fixing screw about 2 mm from the floating base.



2. Disc base fixing
Place the sub-assembly of the spring and center cap onto the motor spindle on the disc base taking care that the center cap is not removed by the spring.
Fix the set screw when the upper side of disc base is 16.8 ±0.1 mm above the upper side of floating base.
Be sure to perform this adjustment using slide calipers.

8-(2) Service life of the laser diode

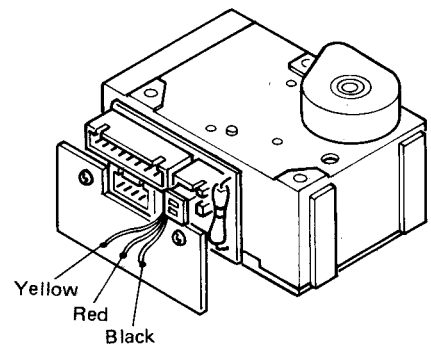
1. Connect the IC101 pin ㉟ of LSI PCB(ENN-009) to GND and switch the laser ON then measure with the power meter. If a reading of less than 0.3 mW is obtained, the service life of the laser diode should be judged as having expired.
2. When the EFM output is extremely low and the voltage across R307 of servo PCB(ENN-010) exceeds 1 V, the service life of the laser diode should be judged as having expired.

8-(3) Replacement of the pickup

1. Take out a new pickup from a box and unsolder the three wires from the APC PCB (ENN-014) of the old pickup then solder them to the new pickup following the table.
2. Mount the pickup in the mechanism assembly and connect the wires from the APC PCB to each connector of the pickup.
3. Turn laser power adjustment resistor R-604 fully counterclockwise.
4. After completing the installation of the pickup in the mechanical assembly and connecting its connectors, remove the shorting pin of the pickup.
5. Adjust laser diode output and grating referring to the adjustment procedure.

601	602	603
Yellow	Black	Red

Table for APC connection



9. Adjustment Procedure (Electric Adjustments)

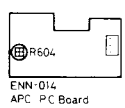
9-(1) Laser diode output adjustment

(Perform this adjustment only when the photo pickup is replaced.)

1) Measuring apparatus and instruments for adjustment
Photo power meter (Anritsu ML-96A) and photo detector (Anritsu MA912A) or oscilloscope.

2) Adjusting procedure

1. Connect test point ENN-009 IC101 Pin ㉟ to GND.
2. Stick the photo detector to the photo pickup lens and adjust R604 so that the photo power meter output is 0.4 mW.
3. If no photo power meter is available, adjust R604 so that the EFM level between ENN-010 Q309 emitter and GND is 1.5 Vpp during playing a disc.
In this case, before adjustment, set R604 to around its center.

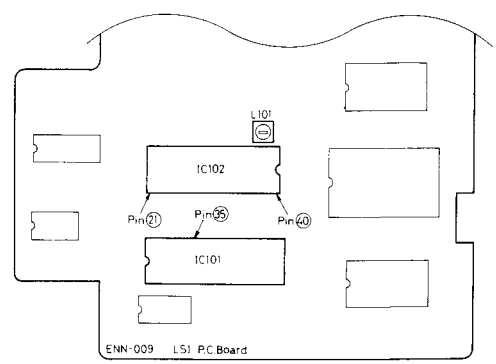


9-(2) PLL adjustment

1) Adjustment instrument
Frequency counter

2) Adjusting procedure

1. Connect the frequency counter between ENN009 IC102 Pin ㊵ and GND.
2. Set L-101 to 4.310 ±0.01 MHz by turning it with the regulating rod. Perform the frequency check 10 minutes after switching on the power.



9-(3) Focus offset adjustment

1) Adjustment instruments
Oscilloscope, Small screwdriver, Normal disc

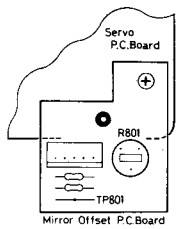
2) Adjusting procedure

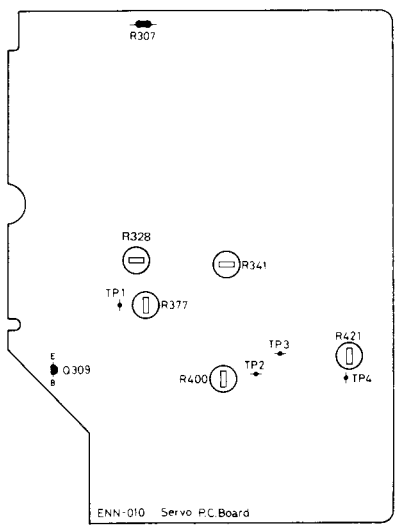
1. Connect the oscilloscope between TP-7 and GND and play a disc.
2. Output the eye pattern on the oscilloscope and adjust R328 so that the amplitude is maximum and the center part of the eye pattern is a clear waveform.

3) Remark
Perform this adjustment again after 9-(10) Kick gain adjustment to obtain the optimum pattern.

9-(4) Tracking offset rough adjustment

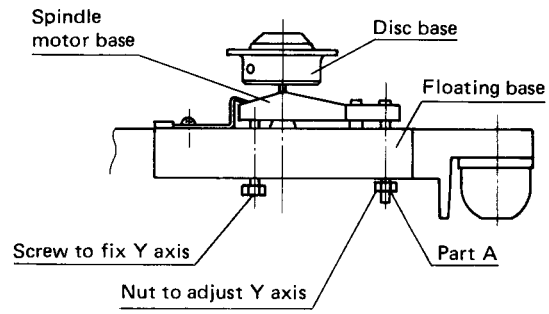
1) Adjustment instrument
Oscilloscope
2) Adjusting procedure
1. Short-circuit TP-2 and TP-3 on ENN-010 PCB.
2. Play a disc.
3. Connect the oscilloscope to TP-1 and adjust R377 so that the waveform on the screen is symmetrical with respect to 0 electric potential.
4. Set the voltage between TP-801 in the mirror offset PCB and GND to 0 V ± 0.2 V by adjusting the R801 after switching the power on.





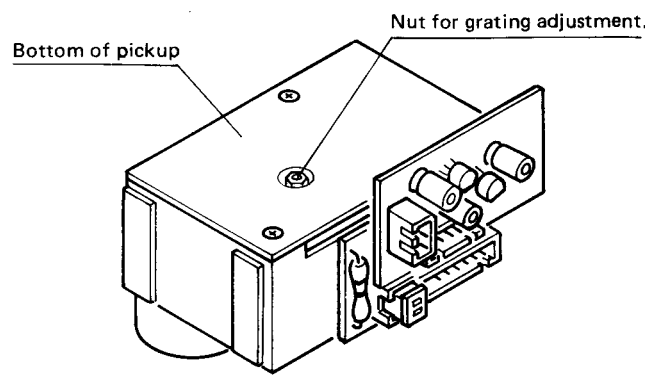
9-(5) Adjustment of movement to the left or the right of spindle motor (Y axis adjustment)

1) Adjustment instrument
Oscilloscope, 3 ϕ box
2) Adjusting procedure
1. Connect the oscilloscope to the emitter Q309 of ENN-010.
2. Play a disc.
3. Turn the Y axis adjustment nut installed on the disc base so that the RF signal is maximum and the amount of jitter is minimum.
4. Secure the fixing screw slightly to lock it.
5. Check again that the amount of jitter is not increased.



9-(6) Grating adjustment

1) Adjustment instruments
Oscilloscope, Normal disc, Hexagonal wrench
2) Adjusting procedure
1. Connect the oscilloscope to TP-1.
2. Load a disc.
3. Play a disc until 1/3 of disc is played (15 minutes in time at 34 mm radius).
4. Short-circuit TP-2 and TP-3.
5. Turn the grating adjustment nut under the pickup and find the point where the tracking error signal of TP-1 is maximum and then fix it. Do not turn this nut more than ±90°.
6. Return the pickup to the inner track and make sure that there is no change.
7. Advance the pickup to the outer track and make sure that there is no change.



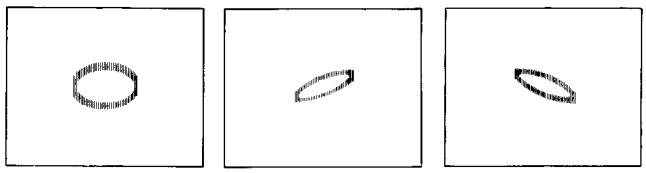
9-(7) Tracking offset fine adjustment

Use the same method for tracking offset rough adjustment.

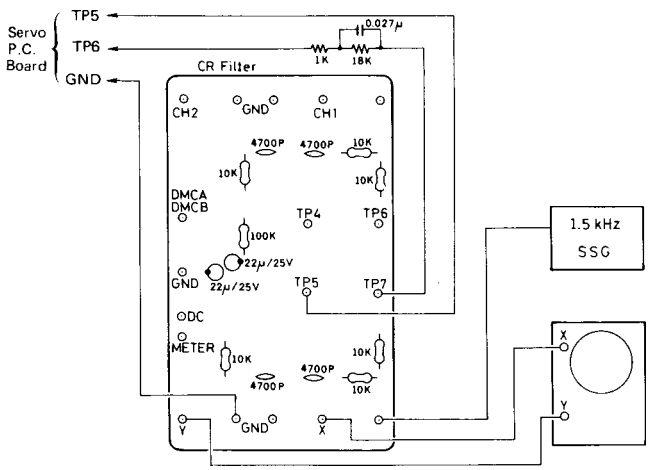
9-(8) Focus gain adjustment

1) Adjustment instruments
   Oscilloscope, CR filter (EBSJ1002: common to models XL-V1 and XL-V2), Signal generator
2) Adjusting procedure

1. Connect the signal generator (SG), oscilloscope and CR filter as shown in the figure below.
2. Set the SG to 1.5 kHz, 450 mVpp on channel 1.
3. Play a disc and adjust R341 to obtain the optimum Lissajous' figure on the oscilloscope as shown below.
4. Add the circuit composed of 1 kohm and 18 kohms resistors and a 0.027 μF capacitor between TP-7 and the circuit if the waveform is unstable.



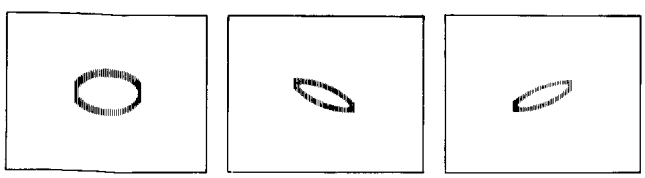
OK　　Bad (too low)　　Bad (too high)



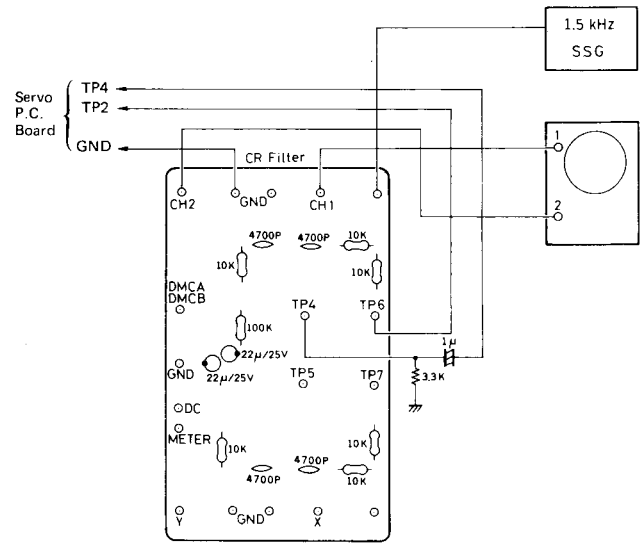
9-(9) Tracking gain adjustment

1) Adjustment instruments
   Oscilloscope, CR filter (EBSJ1102: common to models XL-V1 and XL-V2), SG
2) Adjusting procedure

1. Connect the SG, oscilloscope and CR filter as shown in the figure below.
2. Set the SG to 1.5 kHz, 450 mVpp on channel 1.
3. Play a disc and adjust R400 to obtain the optimum Lissajous' figure on the oscilloscope as shown below.
4. If a stable waveform is not available due to extreme eccentricity, insert a high-pass filter of 1 μF NP. E Cap and 3.3 kohms between TP-4 and the circuit to stabilize the waveform.



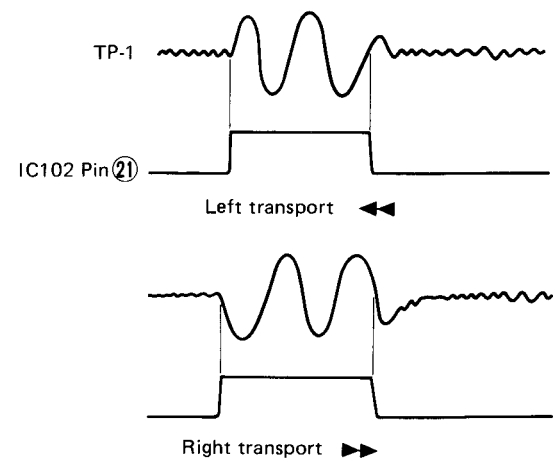
OK　　Bad (too low)　　Bad (too high)



9-(10) Kick gain adjustment

1) Adjustment instrument
   Oscilloscope
2) Adjusting procedure

1. Play a disc.
2. Connect TP-1 to ch-1 of the oscilloscope and IC102 pin ㉑ on ENN-009 PCB to ch-2 of the oscilloscope.
3. Set to the manual search mode and adjust R421 while repeating right and left transports within 4 seconds as shown in figure below.



4. Be sure to repeat within 4 seconds because the manual search enters the fast mode when more than 4 seconds pass and adjustment becomes difficult.

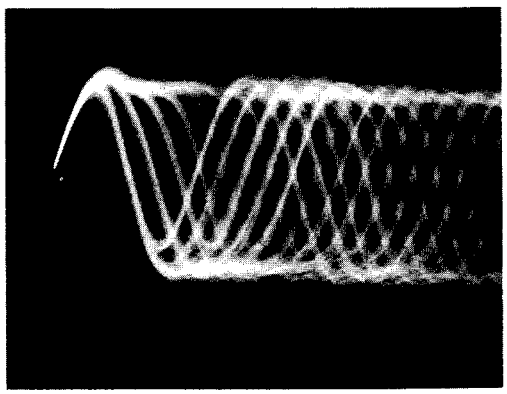
9-(11) Tracking mirror offset adjustment

1. Connect the oscilloscope to TP-7 and GND.
2. Play a disc and turn R801 observing the oscilloscope so that the amplitude of waveform is maximum then fix it.
3. Simultaneously check the voltage between TP-1 and GND and that the amplitude of waveform is maximum at the same point as TP-7.

10. Important Waveforms

1. Eye pattern (RF signal)
Q309 emitter; standard eye pattern.

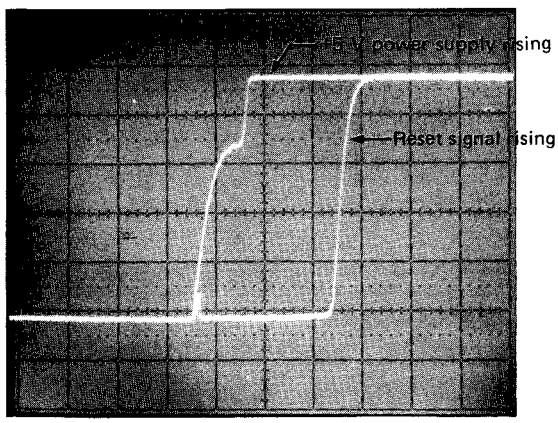
Q309 emitter



Eye pattern 0.5 μs/div 0.5 V/div

2. Reset signal of microcomputer IC101
Q113 collector (IC101 Pin ⑱)

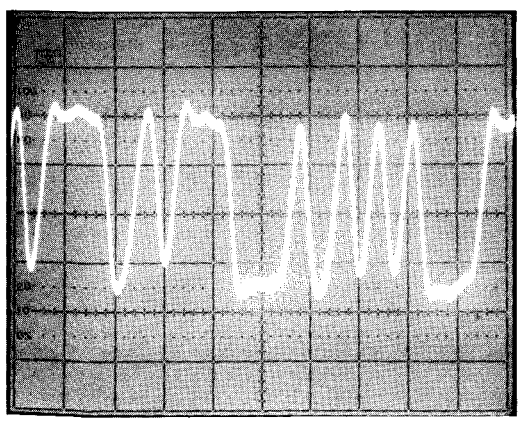
Q113 collector



0.1 sec/div 1 V/div

3. Eye pattern partially expanded
Shows the Q309 emitter eye pattern.

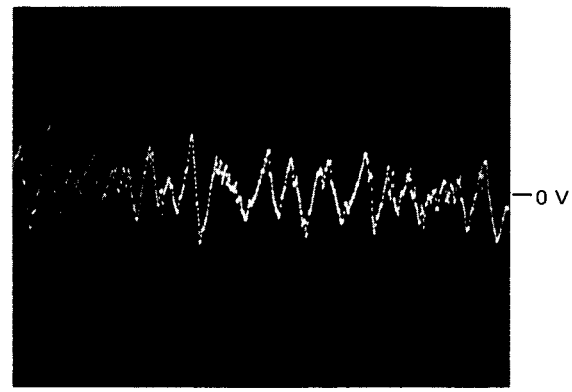
Each eye pattern



0.5 μs/div 0.5 V/div

4. Focus signal during play
T-5 operates with period of about 0.2 – 1 ms.

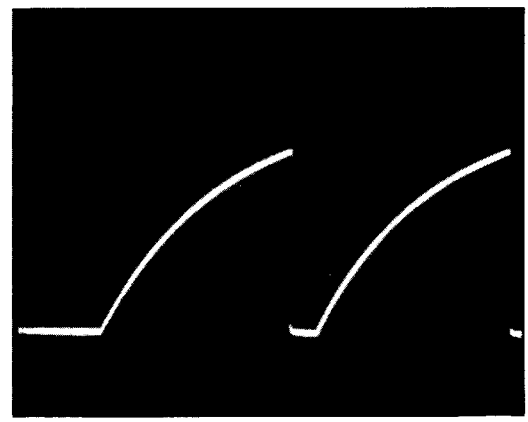
Focus signal during T-5 play



1 ms/div 0.1 V/div

5. Focus search voltage
Both edges of C322; the waveform lens is moved up and down by this voltage when the platter is loaded without a disc.

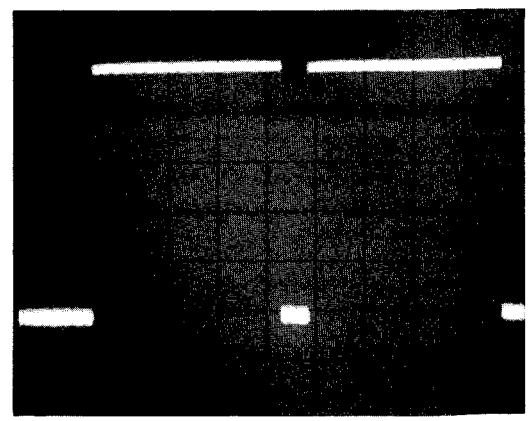
FCS signal C322 both edges



0.5 s/div 1 V/div

6 Pulse for focus search voltage
Pulse for focus search transmitted from IC102

IC102 Pin ⑫ FCS signal

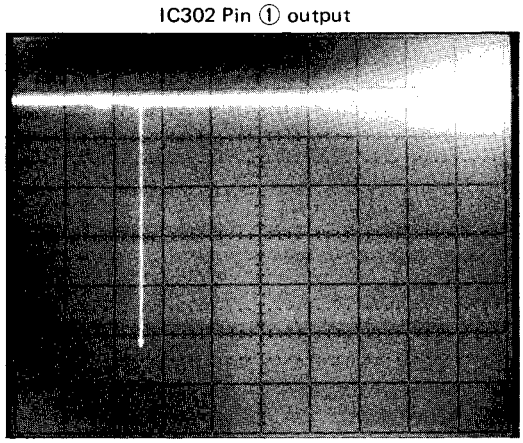


0.5 s/div 1 V/div

7. Focus zero-cross output

Pulse showing that focus output waveform has almost passed the zero point.

IC302 Pin ① output

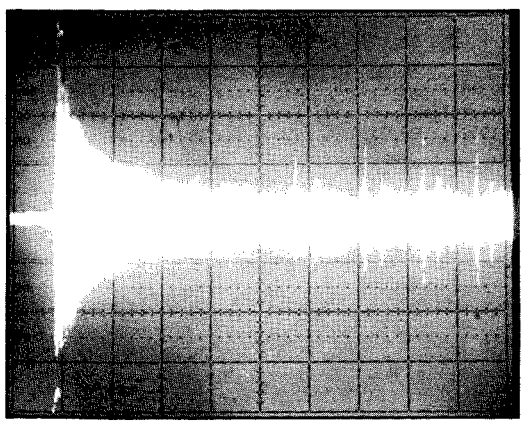


2 ms/div 1 V/div

8 Focus drive waveform

Waveform until focus is obtained, spindle motor starts to rotate and TOC is read.

Q315E, when focus has been finished and spindle motor starts to rotate

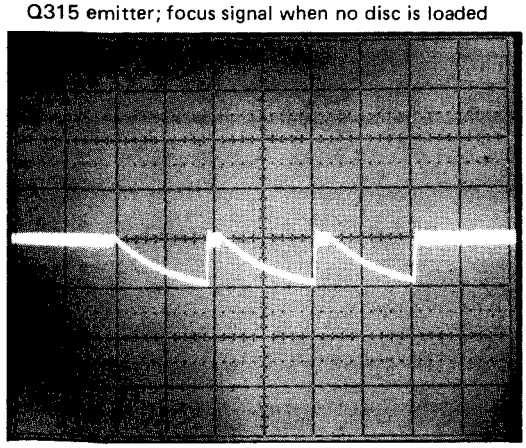


0.2 s/div 1 V/div

9. Drive waveform during focus search

Drive waveform of focus coil when the platter is loaded without a disc.

Q315 emitter; focus signal when no disc is loaded

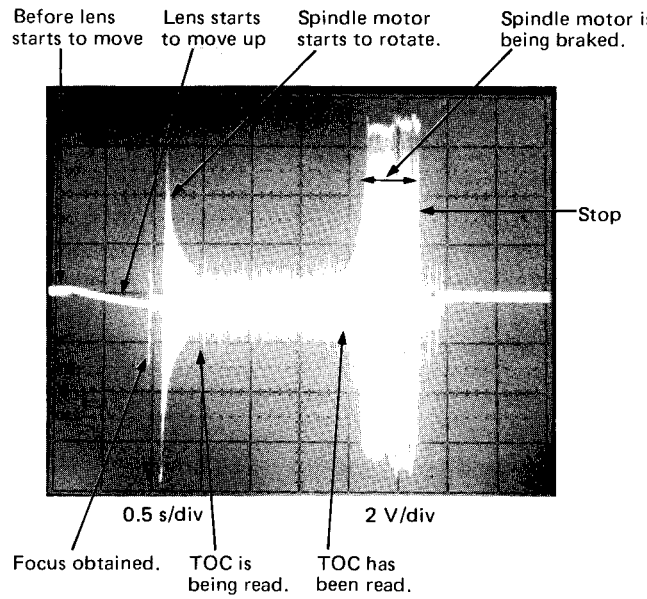


1 s/div 1 V/div

10. Waveform until TOC is read

With Q315 emitter,

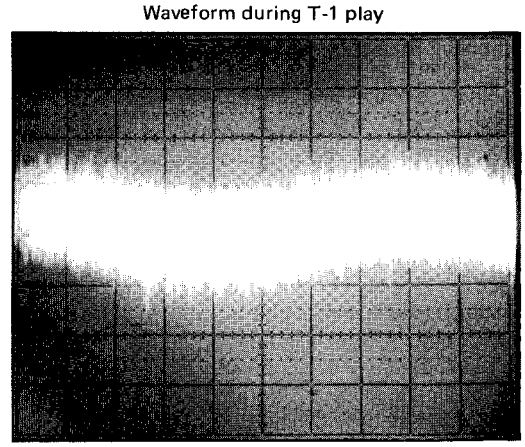
Q315 emitter until TOC has been read and spindle motor stops.



11. Tracking waveform during normal play

T-1 output

Waveform during T-1 play

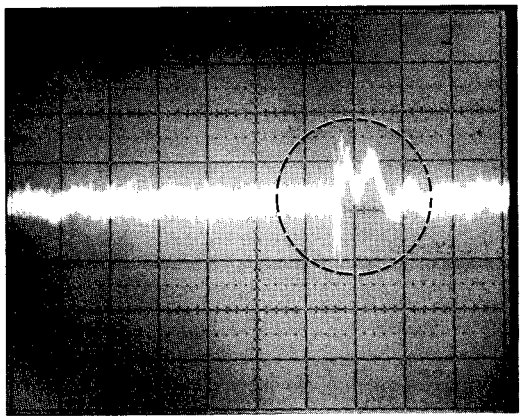


20 ms/div 50 mV/div

12. T-1 waveform of high speed search in forward direction

Output when track is jumped is visible

T1; in case of transporting in high speed search ▶▶

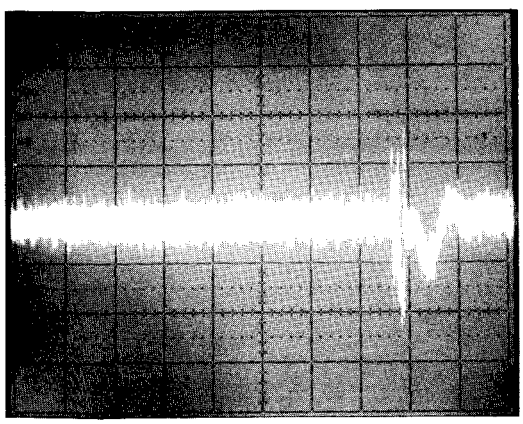


5 ms/div 0.2 V/div

13. T-1 waveform of high speed search in backward direction

The waveform the reverse of that in high speed search in forward direction is shown.

T-1; in case of returning by high speed search ◀◀

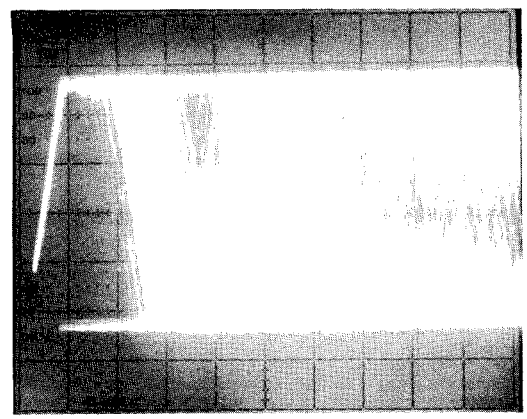


5 ms/div 0.2 V/div

14. Tracking zero-cross output waveform

Both edges of measuring point R406 of which waveform is as shown on the right but becomes as shown in photo during normal play observing the oscilloscope.

R406 both edge tracking zero-cross

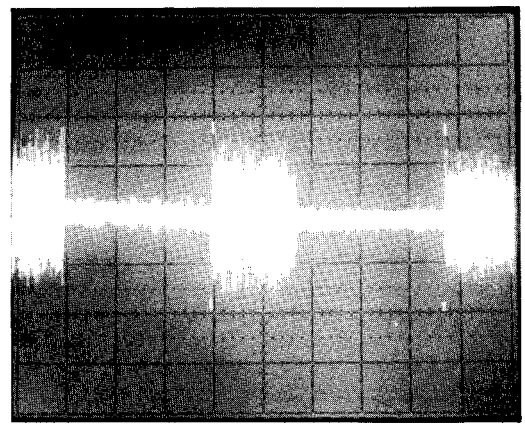


10 μs/div 1 V/div

15. Drive waveform during high speed search

Output such as noise is output when track is crossed.

Q317 emitter during high speed search

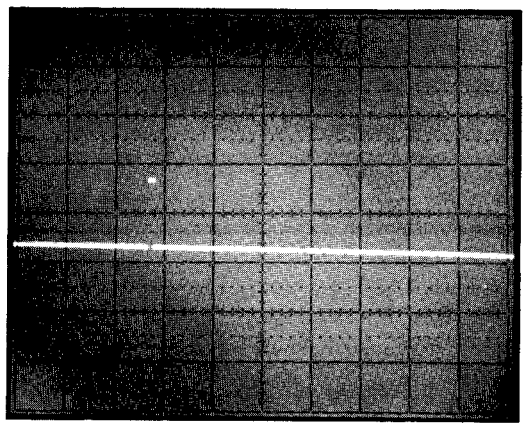


10 ms/div 1 V/div

16. Waveform when a disc having scratches is played

Output waveform of scratch detection circuit IC303; photographed by sticking a tape about 1 mm wide around outer edge.

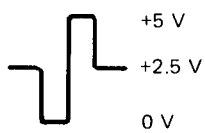
IC304 Pin ② output with a disc having scratches and outer edge 1 mm wide.



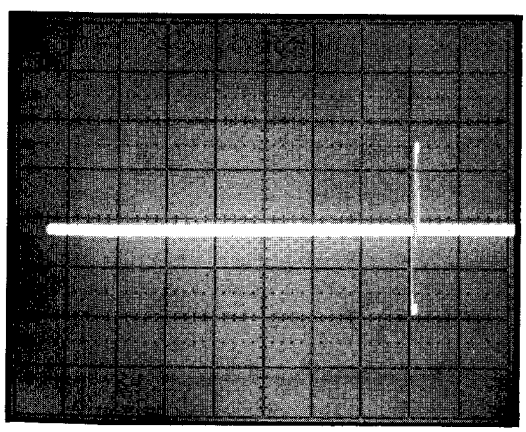
10 ms/div 1 V/div

17. Kick pulse when searching

When advancing the track, waveform below is output.



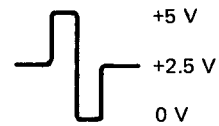
Kick pulse of C345 both edges when ▶▶ is used.



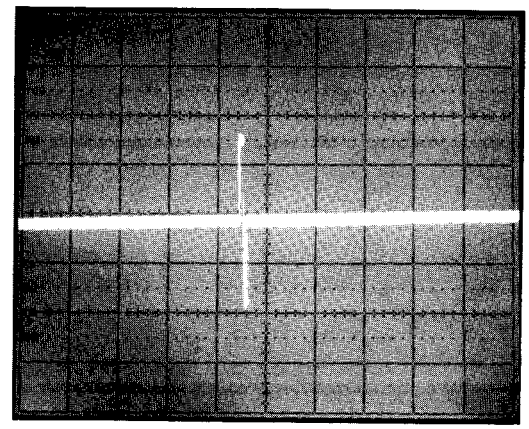
5 ms/div 0.5 V/div

18. Kick pulse when searching

When returning the track, waveform below is output.



Kick pulse of C345 both edges when ◀◀ is used.

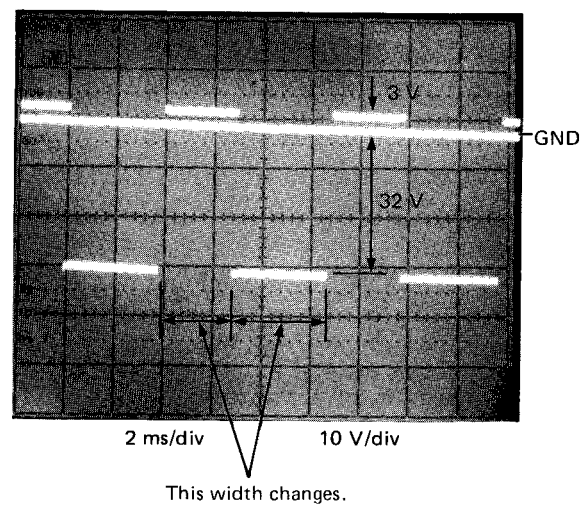


5 ms/div 0.5 V/div

19. Part of FL drive waveform

Duty is changed depending on letter indicated.

IC502 Pin ⑱ FL drive waveform (changes depending on the indication)

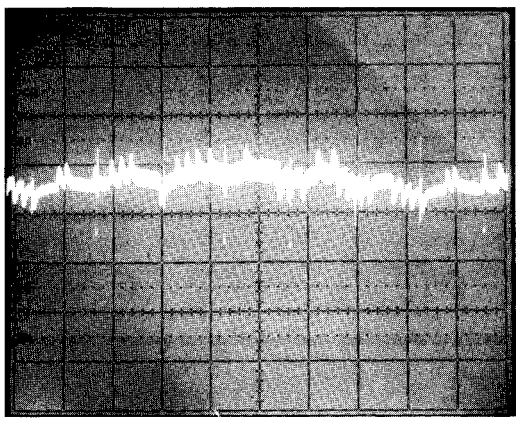


2 ms/div 10 V/div

This width changes.

20. Spindle motor drive waveform during play

Spindle motor drive waveform during play

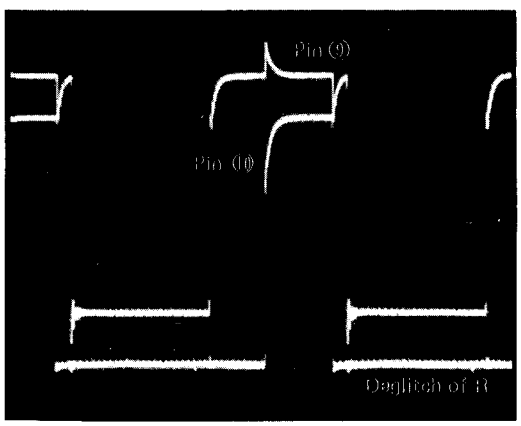


20 ms/div 1.0 V/div

21. L/R switching signal and deglitch signal of R

R deglitch signal is input when switching signal is at "H" level.

Waveforms of IC106 Pin ⑨ and ⑩

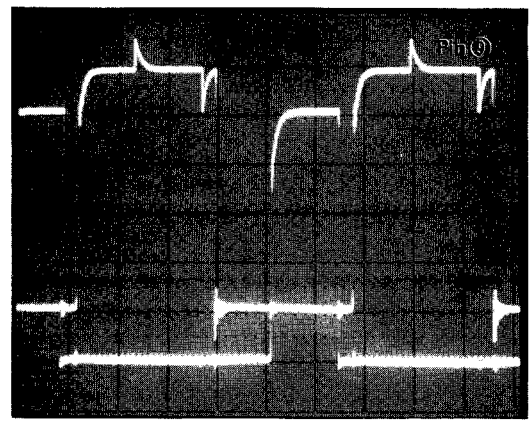


2 μs/div 1 V/div

22. L/R switching signal and deglitch signal of L

L deglitch signal is input when switching signal is at "L" level.

Waveforms of IC106 Pins ⑨ and ⑪



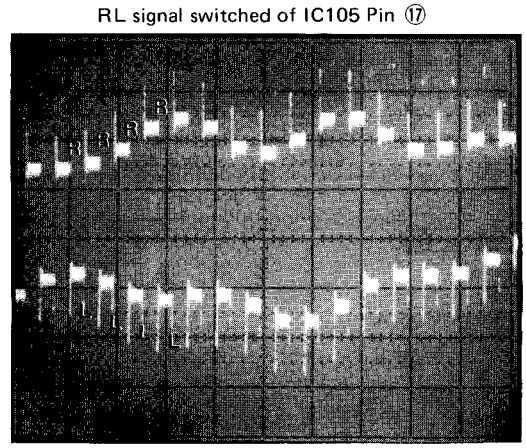
2 μs/div 1 V/div

Note: Photos 21 and 22 are shifted by 1 V for better visibility.

23. AF signal switched after D/A

Waveform showing that R and L are output alternately.

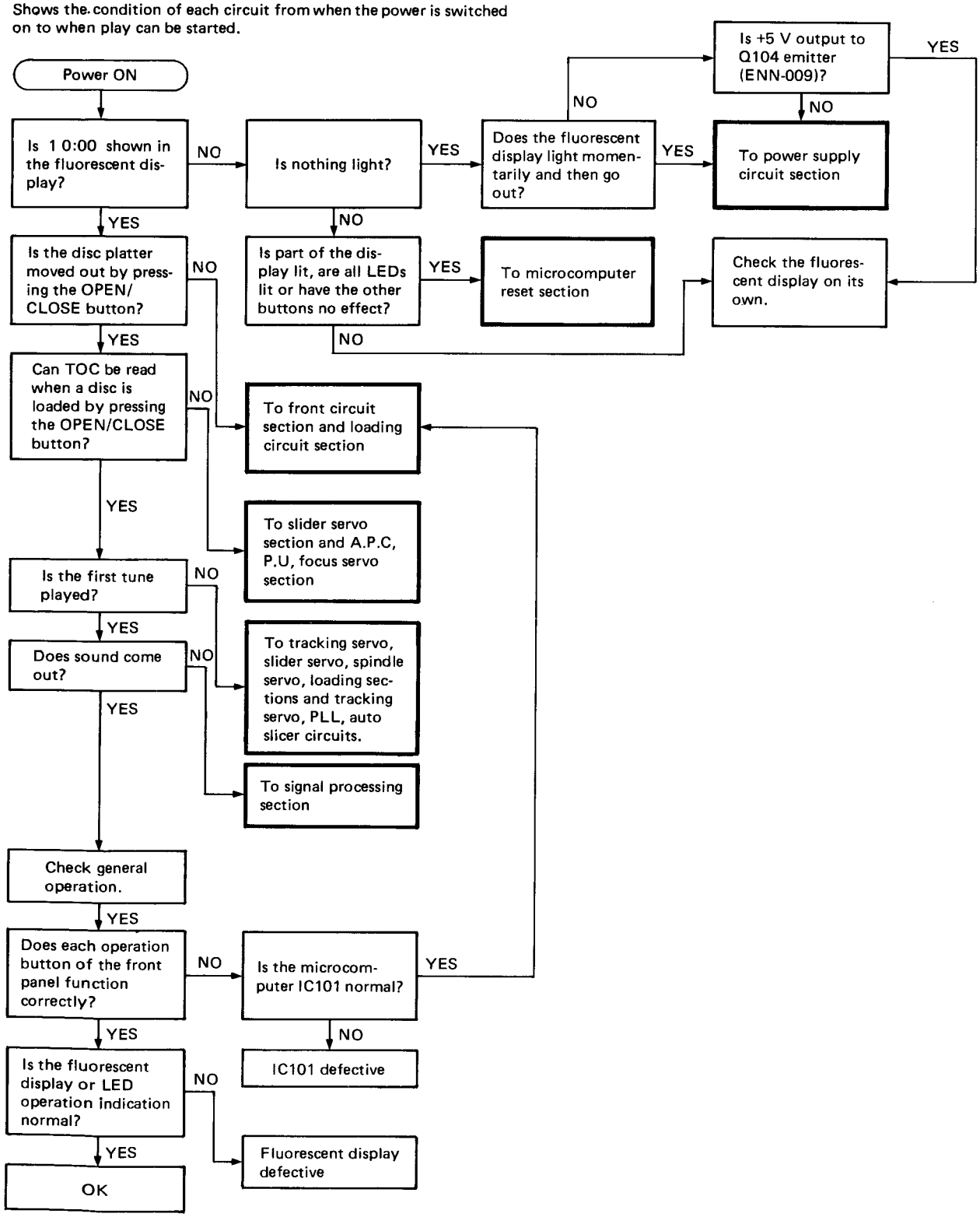
RL signal switched of IC105 Pin ⑰



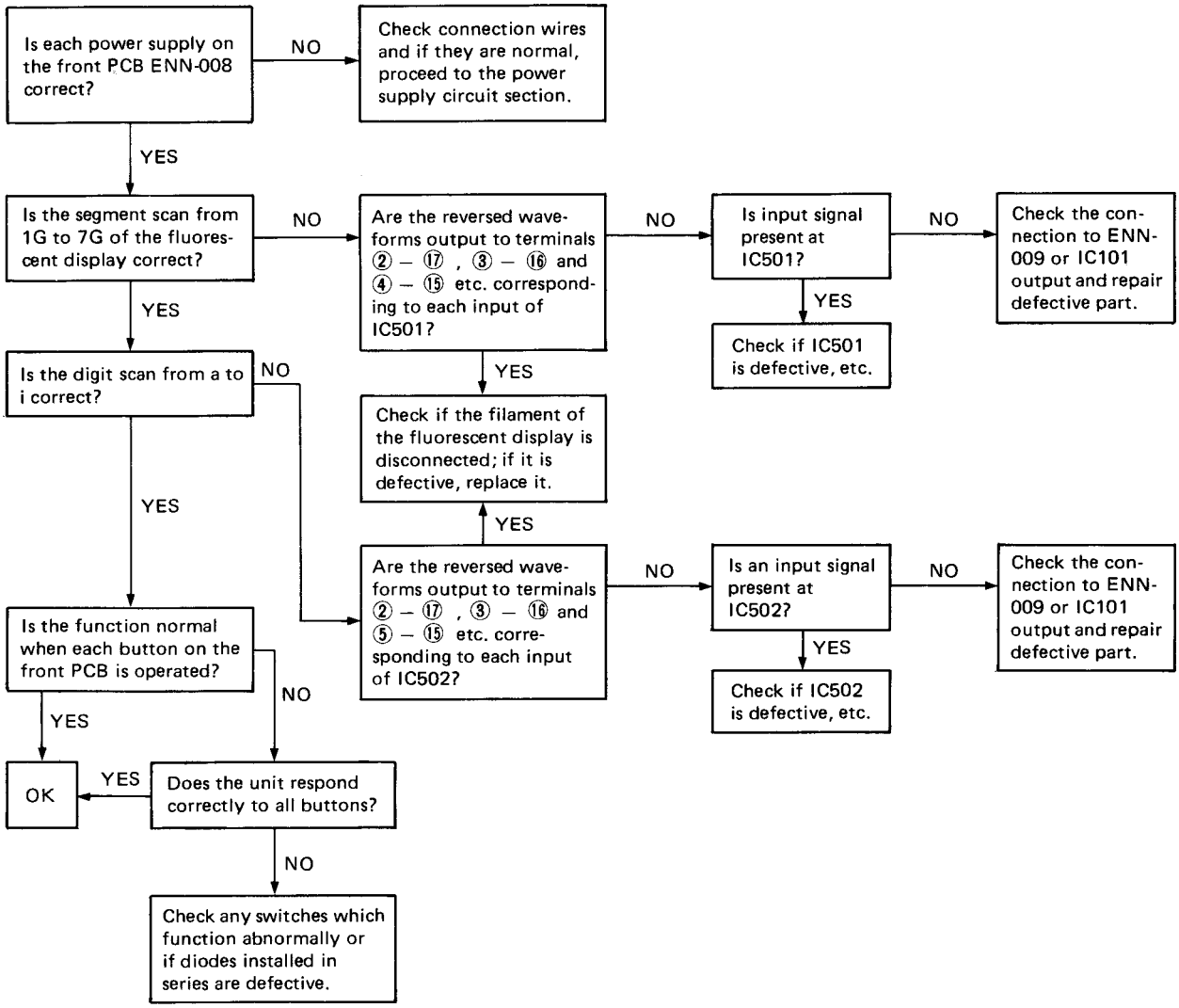
10 μs/div 0.5 V/div

11. Troubleshooting

Shows the condition of each circuit from when the power is switched on to when play can be started.

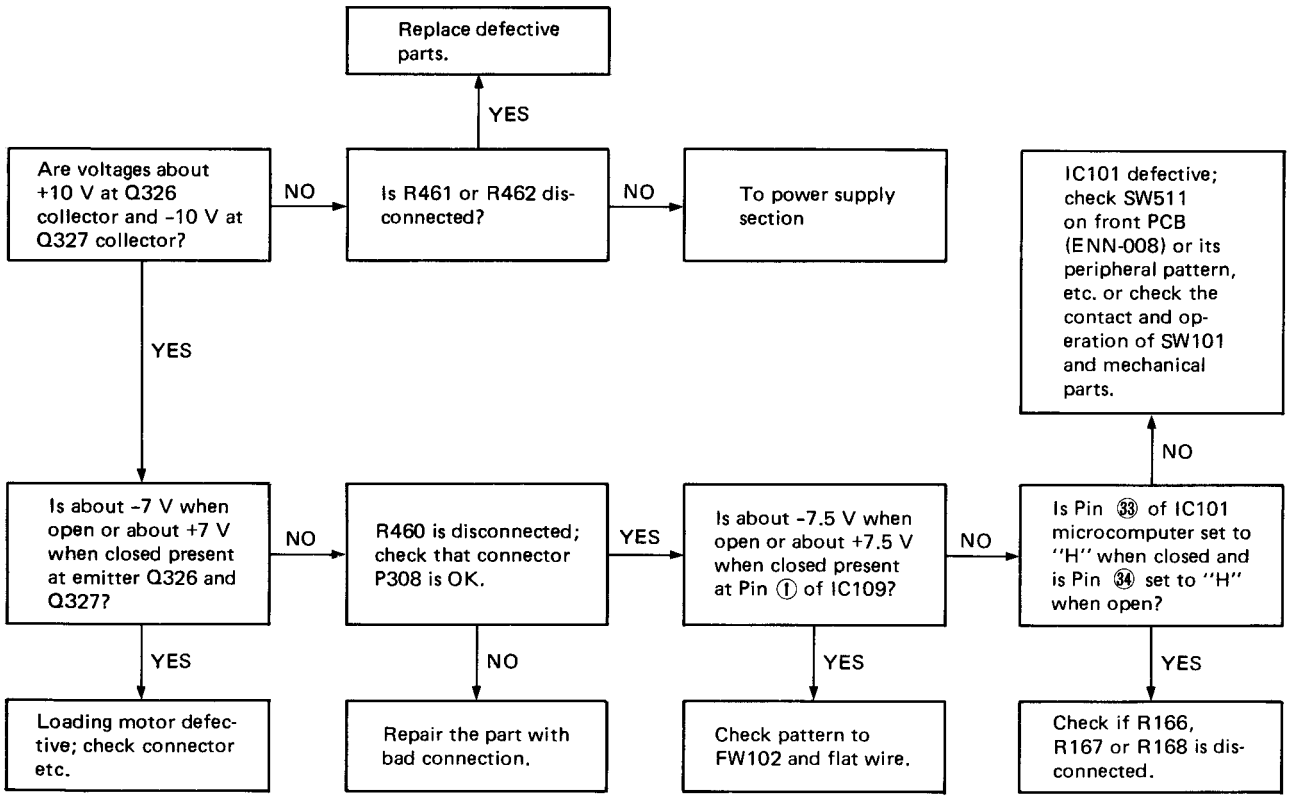

Power ON
Is 1 0:00 shown in the fluorescent display?
NO
Is nothing light?
YES
Does the fluorescent display light momentarily and then go out?
YES
To power supply circuit section
NO
Is +5 V output to Q104 emitter (ENN-009)?
YES
NO
YES
Is the disc platter moved out by pressing the OPEN/CLOSE button?
NO
Is part of the display lit, are all LEDs lit or have the other buttons no effect?
YES
To microcomputer reset section
Check the fluorescent display on its own.
NO
YES
Can TOC be read when a disc is loaded by pressing the OPEN/CLOSE button?
NO
To front circuit section and loading circuit section
YES
To slider servo section and A.P.C, P.U, focus servo section
Is the first tune played?
NO
YES
Does sound come out?
NO
To tracking servo, slider servo, spindle servo, loading sections and tracking servo, PLL, auto slicer circuits.
YES
To signal processing section
Check general operation.
YES
Does each operation button of the front panel function correctly?
NO
Is the microcomputer IC101 normal?
YES
NO
IC101 defective
YES
Is the fluorescent display or LED operation indication normal?
NO
Fluorescent display defective
YES
OK

Front PCB section

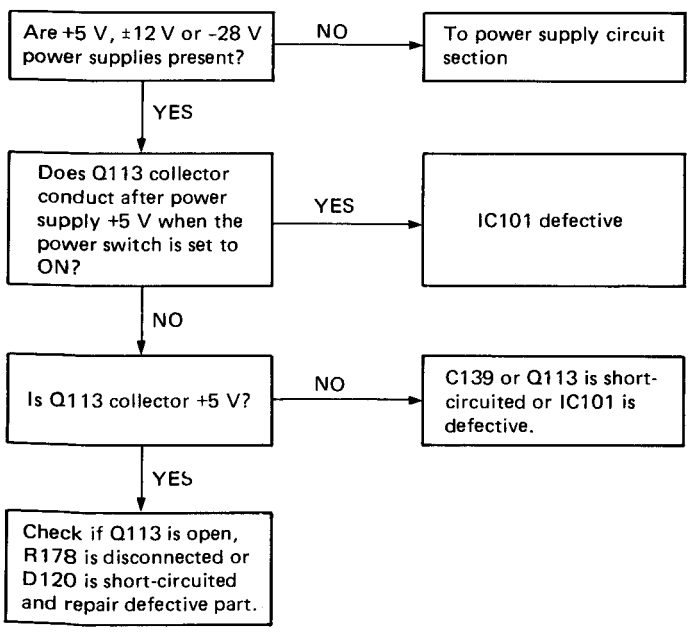

Is each power supply on the front PCB ENN-008 correct?
NO
Check connection wires and if they are normal, proceed to the power supply circuit section.
YES
Is the segment scan from 1G to 7G of the fluorescent display correct?
NO
Are the reversed waveforms output to terminals ② – ⑰ , ③ – ⑯ and ④ – ⑮ etc. corresponding to each input of IC501?
NO
Is input signal present at IC501?
NO
Check the connection to ENN-009 or IC101 output and repair defective part.
YES
Check if IC501 is defective, etc.
YES
Is the digit scan from a to i correct?
NO
YES
Check if the filament of the fluorescent display is disconnected; if it is defective, replace it.
YES
Are the reversed waveforms output to terminals ② – ⑰ , ③ – ⑯ and ⑤ – ⑮ etc. corresponding to each input of IC502?
NO
Is an input signal present at IC502?
NO
Check the connection to ENN-009 or IC101 output and repair defective part.
YES
Check if IC502 is defective, etc.
Is the function normal when each button on the front PCB is operated?
NO
YES
OK
YES
Does the unit respond correctly to all buttons?
NO
Check any switches which function abnormally or if diodes installed in series are defective.

Loading circuit

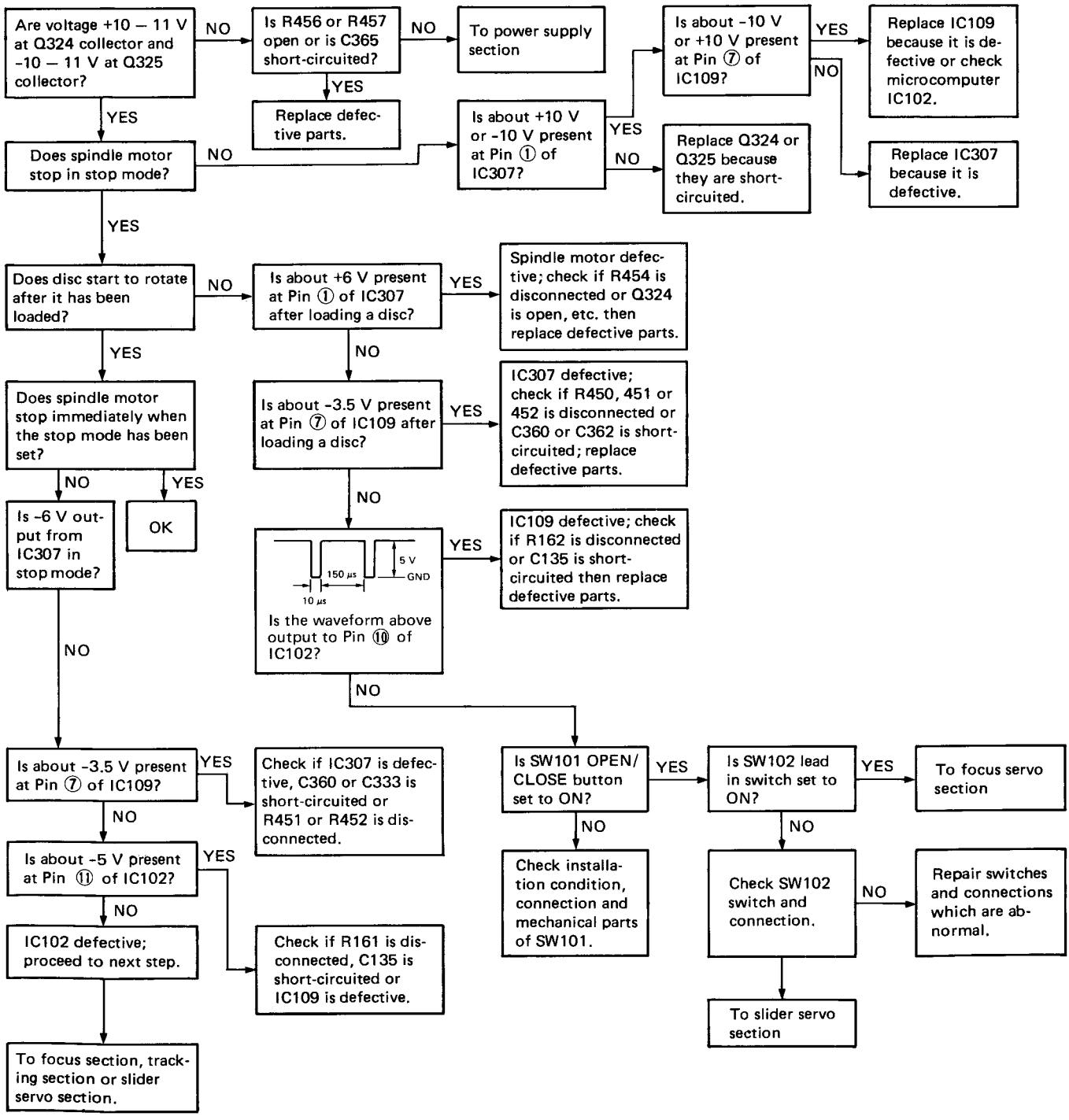
(Perform these steps when the drawer does not move even when the OPEN/CLOSE button on the front panel is pressed.)


Replace defective parts.
YES
Are voltages about +10 V at Q326 collector and -10 V at Q327 collector?
NO
Is R461 or R462 disconnected?
NO
To power supply section
IC101 defective; check SW511 on front PCB (ENN-008) or its peripheral pattern, etc. or check the contact and operation of SW101 and mechanical parts.
NO
YES
Is about -7 V when open or about +7 V when closed present at emitter Q326 and Q327?
NO
R460 is disconnected; check that connector P308 is OK.
YES
Is about -7.5 V when open or about +7.5 V when closed present at Pin ① of IC109?
NO
Is Pin ㉝ of IC101 microcomputer set to "H" when closed and is Pin ㉞ set to "H" when open?
YES
YES
NO
YES
Loading motor defective; check connector etc.
Repair the part with bad connection.
Check pattern to FW102 and flat wire.
Check if R166, R167 or R168 is disconnected.

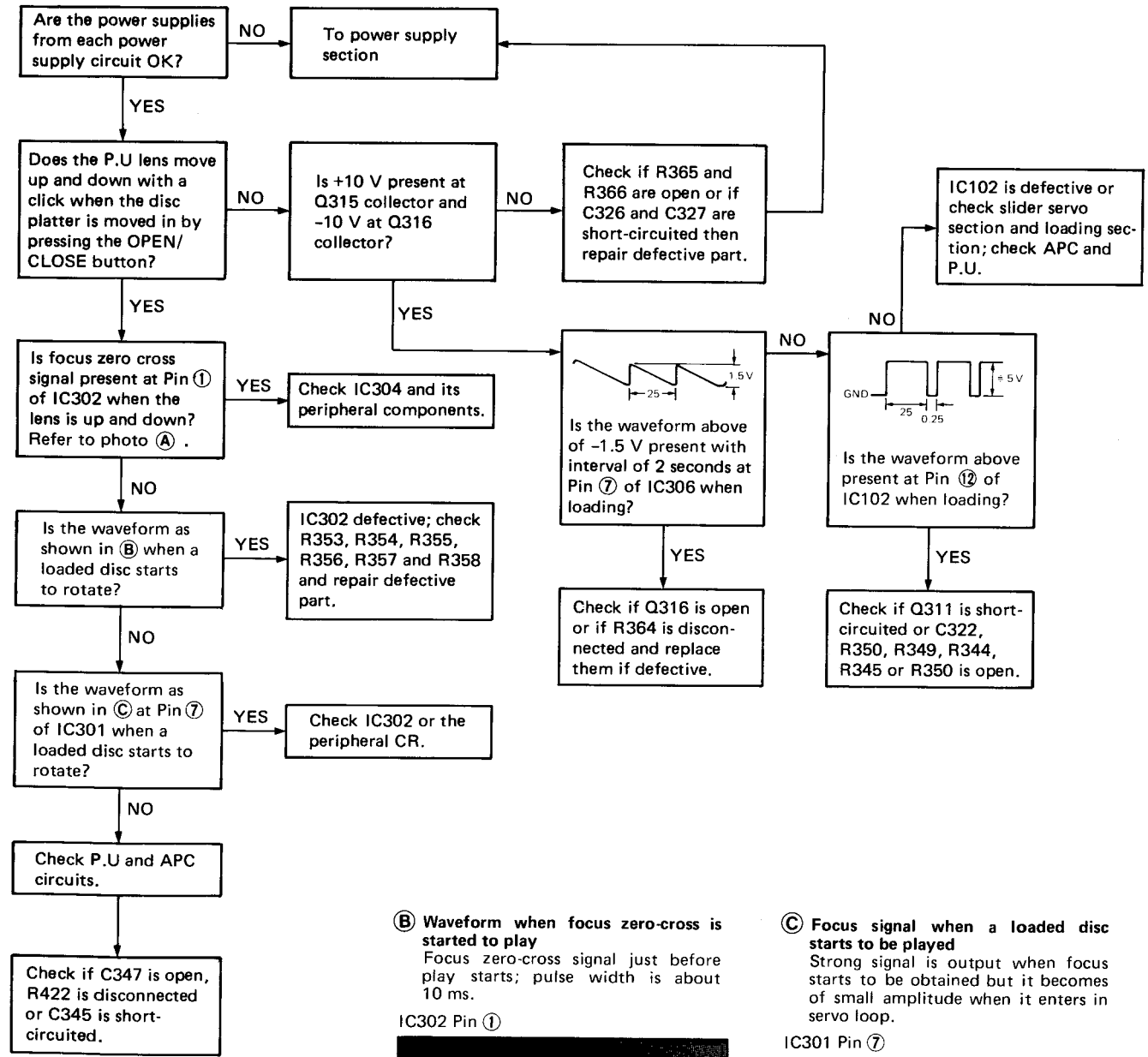
Reset circuit section


Are +5 V, ±12 V or -28 V power supplies present?
NO
To power supply circuit section
YES
Does Q113 collector conduct after power supply +5 V when the power switch is set to ON?
YES
IC101 defective
NO
Is Q113 collector +5 V?
NO
C139 or Q113 is short-circuited or IC101 is defective.
YES
Check if Q113 is open, R178 is disconnected or D120 is short-circuited and repair defective part.

Spindle motor section

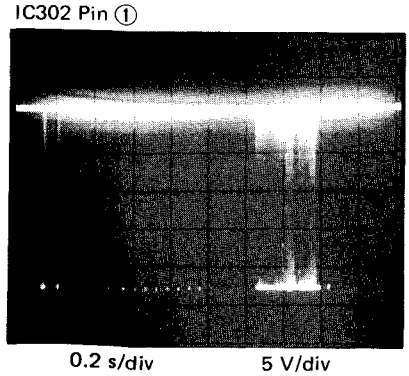

Are voltage +10 – 11 V at Q324 collector and -10 – 11 V at Q325 collector?
NO
Is R456 or R457 open or is C365 short-circuited?
NO
To power supply section
YES
Replace defective parts.
YES
Does spindle motor stop in stop mode?
NO
Is about +10 V or -10 V present at Pin ① of IC307?
YES
NO
Is about -10 V or +10 V present at Pin ⑦ of IC109?
YES
NO
Replace IC109 because it is defective or check microcomputer IC102.
Replace Q324 or Q325 because they are short-circuited.
Replace IC307 because it is defective.
YES
Does disc start to rotate after it has been loaded?
NO
Is about +6 V present at Pin ① of IC307 after loading a disc?
YES
Spindle motor defective; check if R454 is disconnected or Q324 is open, etc. then replace defective parts.
YES
NO
Does spindle motor stop immediately when the stop mode has been set?
Is about -3.5 V present at Pin ⑦ of IC109 after loading a disc?
YES
IC307 defective; check if R450, 451 or 452 is disconnected or C360 or C362 is short-circuited; replace defective parts.
NO
YES
NO
Is -6 V output from IC307 in stop mode?
OK
150 µs
10 µs
5 V
GND
Is the waveform above output to Pin ⑩ of IC102?
YES
IC109 defective; check if R162 is disconnected or C135 is short-circuited then replace defective parts.
NO
NO
Is about -3.5 V present at Pin ⑦ of IC109?
YES
Check if IC307 is defective, C360 or C333 is short-circuited or R451 or R452 is disconnected.
NO
Is about -5 V present at Pin ⑪ of IC102?
YES
NO
IC102 defective; proceed to next step.
Check if R161 is disconnected, C135 is short-circuited or IC109 is defective.
To focus section, tracking section or slider servo section.
Is SW101 OPEN/CLOSE button set to ON?
YES
NO
Check installation condition, connection and mechanical parts of SW101.
Is SW102 lead in switch set to ON?
YES
NO
Check SW102 switch and connection.
NO
Repair switches and connections which are abnormal.
To focus servo section
To slider servo section

Focus servo section


Are the power supplies from each power supply circuit OK?
NO
To power supply section
YES
Does the P.U lens move up and down with a click when the disc platter is moved in by pressing the OPEN/ CLOSE button?
NO
Is +10 V present at Q315 collector and -10 V at Q316 collector?
NO
Check if R365 and R366 are open or if C326 and C327 are short-circuited then repair defective part.
IC102 is defective or check slider servo section and loading section; check APC and P.U.
YES
Is focus zero cross signal present at Pin ① of IC302 when the lens is up and down? Refer to photo Ⓐ .
YES
Check IC304 and its peripheral components.
YES
NO
1.5V
25
Is the waveform above of -1.5 V present with interval of 2 seconds at Pin ⑦ of IC306 when loading?
NO
GND
≒5V
25
0.25
Is the waveform above present at Pin ⑫ of IC102 when loading?
NO
Is the waveform as shown in Ⓑ when a loaded disc starts to rotate?
YES
IC302 defective; check R353, R354, R355, R356, R357 and R358 and repair defective part.
YES
YES
Check if Q316 is open or if R364 is disconnected and replace them if defective.
Check if Q311 is short-circuited or C322, R350, R349, R344, R345 or R350 is open.
NO
Is the waveform as shown in Ⓒ at Pin ⑦ of IC301 when a loaded disc starts to rotate?
YES
Check IC302 or the peripheral CR.
NO
Check P.U and APC circuits.
Check if C347 is open, R422 is disconnected or C345 is short-circuited.

Ⓐ **Output waveform of focus zero-cross**
Minus pulse is generated when focus signal passes near zero.

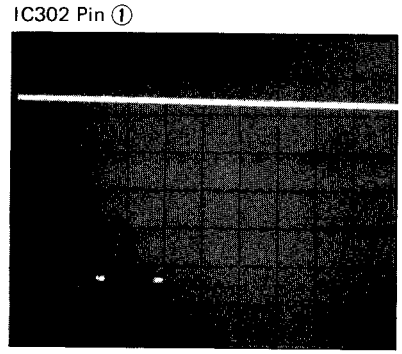
IC302 Pin ①



0.2 s/div 5 V/div

Ⓑ **Waveform when focus zero-cross is started to play**
Focus zero-cross signal just before play starts; pulse width is about 10 ms.

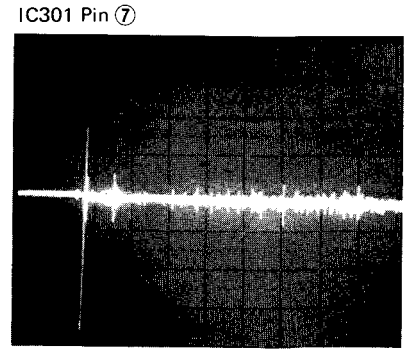
IC302 Pin ①



50 ms/div 5 V/div

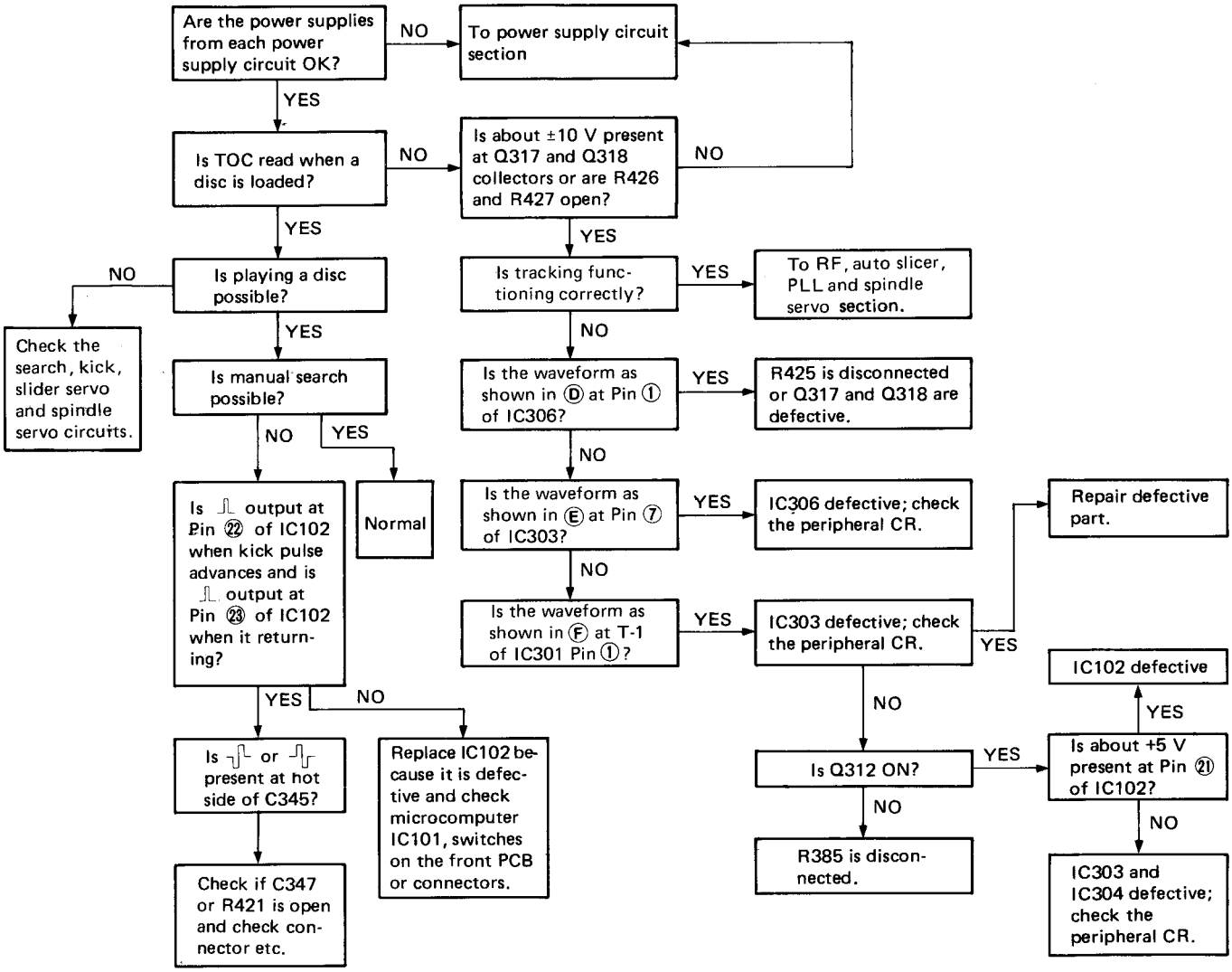
Ⓒ **Focus signal when a loaded disc starts to be played**
Strong signal is output when focus starts to be obtained but it becomes of small amplitude when it enters in servo loop.

IC301 Pin ⑦



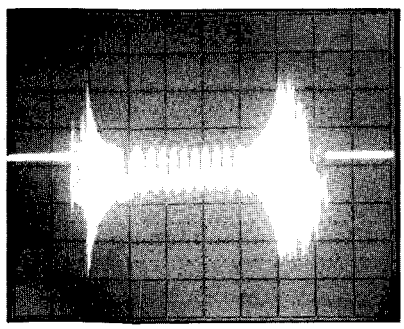
0.1 s/div 0.5 V/div

Tracking servo section


Are the power supplies from each power supply circuit OK?
NO
To power supply circuit section
YES
Is TOC read when a disc is loaded?
NO
Is about ±10 V present at Q317 and Q318 collectors or are R426 and R427 open?
NO
YES
YES
Is playing a disc possible?
NO
Check the search, kick, slider servo and spindle servo circuits.
YES
Is tracking functioning correctly?
YES
To RF, auto slicer, PLL and spindle servo section.
NO
Is manual search possible?
NO
YES
Normal
Is the waveform as shown in Ⓓ at Pin ① of IC306?
YES
R425 is disconnected or Q317 and Q318 are defective.
NO
Is ⎍ output at Pin ㉒ of IC102 when kick pulse advances and is ⎍ output at Pin ㉓ of IC102 when it returning?
Is the waveform as shown in Ⓔ at Pin ⑦ of IC303?
YES
IC306 defective; check the peripheral CR.
Repair defective part.
NO
Is the waveform as shown in Ⓕ at T-1 of IC301 Pin ①?
YES
IC303 defective; check the peripheral CR.
YES
IC102 defective
YES
NO
Is ⎍ or ⎍ present at hot side of C345?
NO
Replace IC102 because it is defective and check microcomputer IC101, switches on the front PCB or connectors.
Is Q312 ON?
YES
Is about +5 V present at Pin ㉑ of IC102?
NO
NO
R385 is disconnected.
IC303 and IC304 defective; check the peripheral CR.
Check if C347 or R421 is open and check connector etc.

Ⓓ Waveform when a disc is loaded
Shows until brake is operated after TOC has been read.

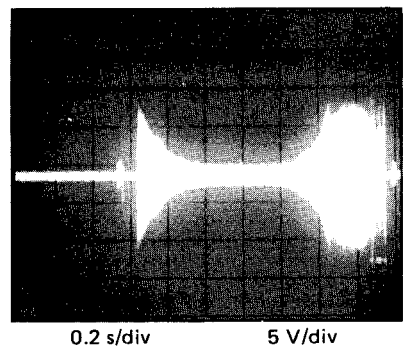
IC306 Pin ①



0.2 s/div 2 V/div

Ⓔ Waveform when a disc is loaded
Shows until brake is operated after TOC has been read.

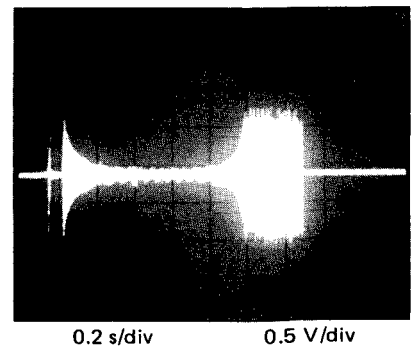
IC303 Pin ⑦



0.2 s/div 5 V/div

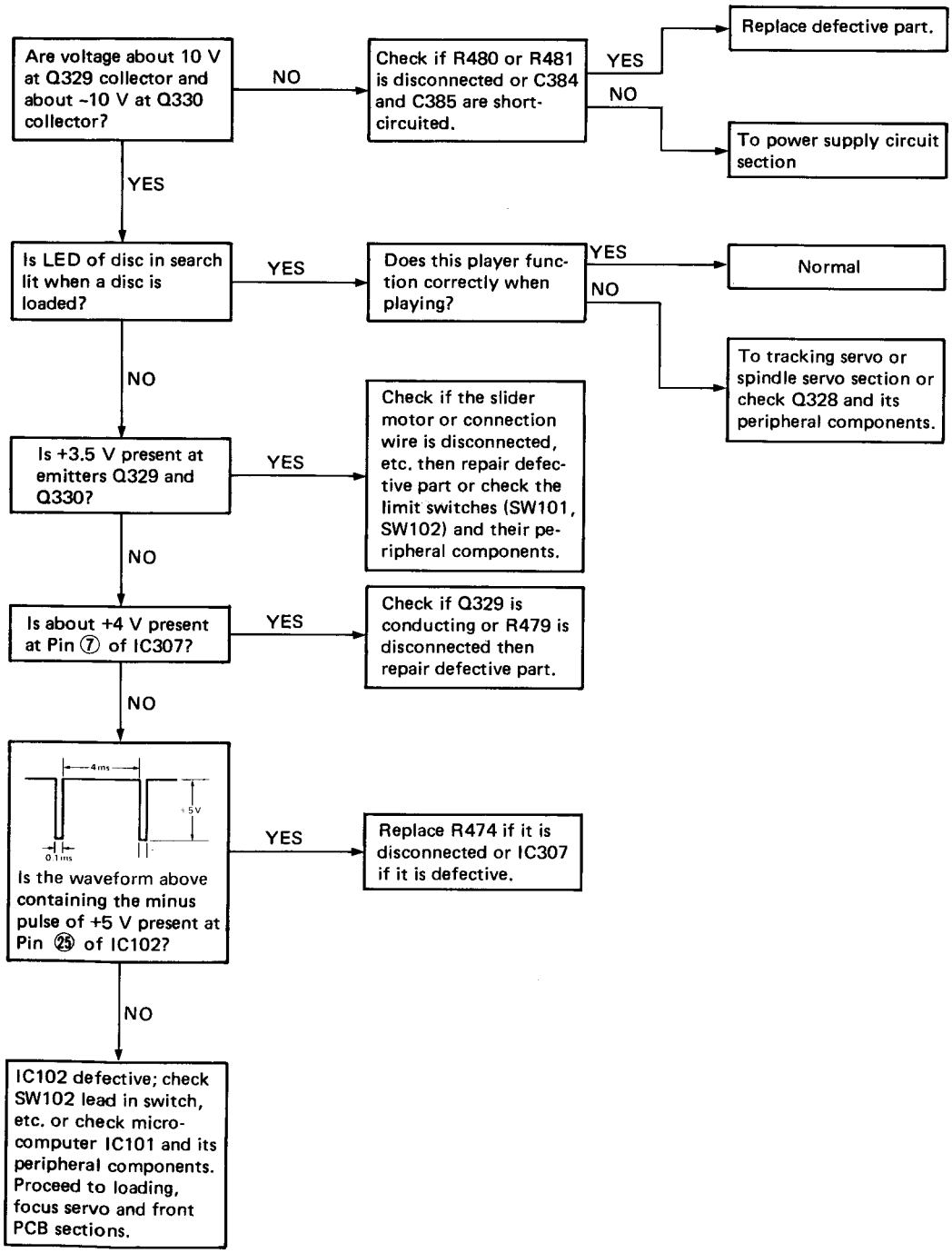
Ⓕ Waveform when a disc is loaded
Shows until brake is operated after TOC has been read.

IC301 Pin ①

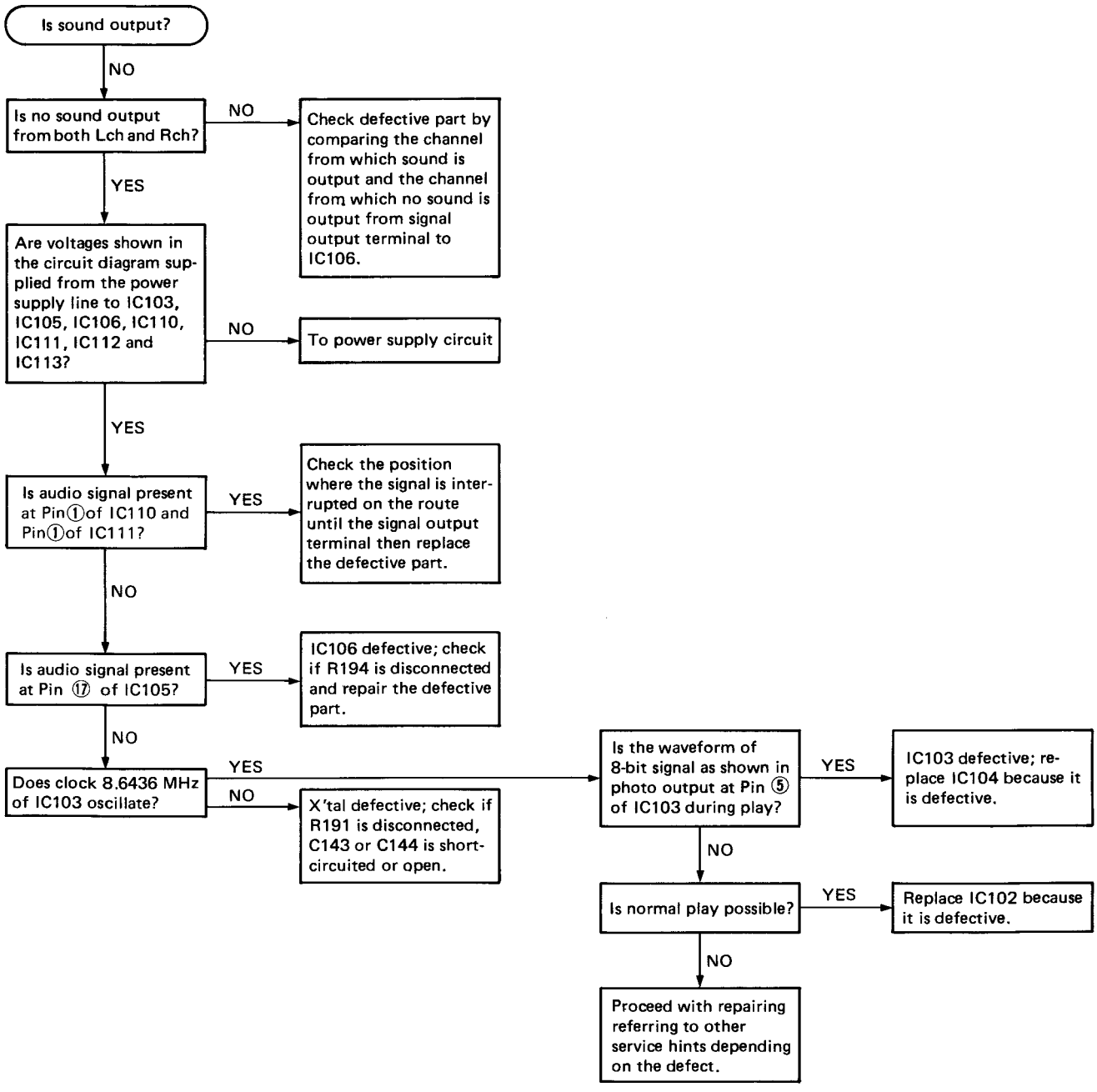


0.2 s/div 0.5 V/div

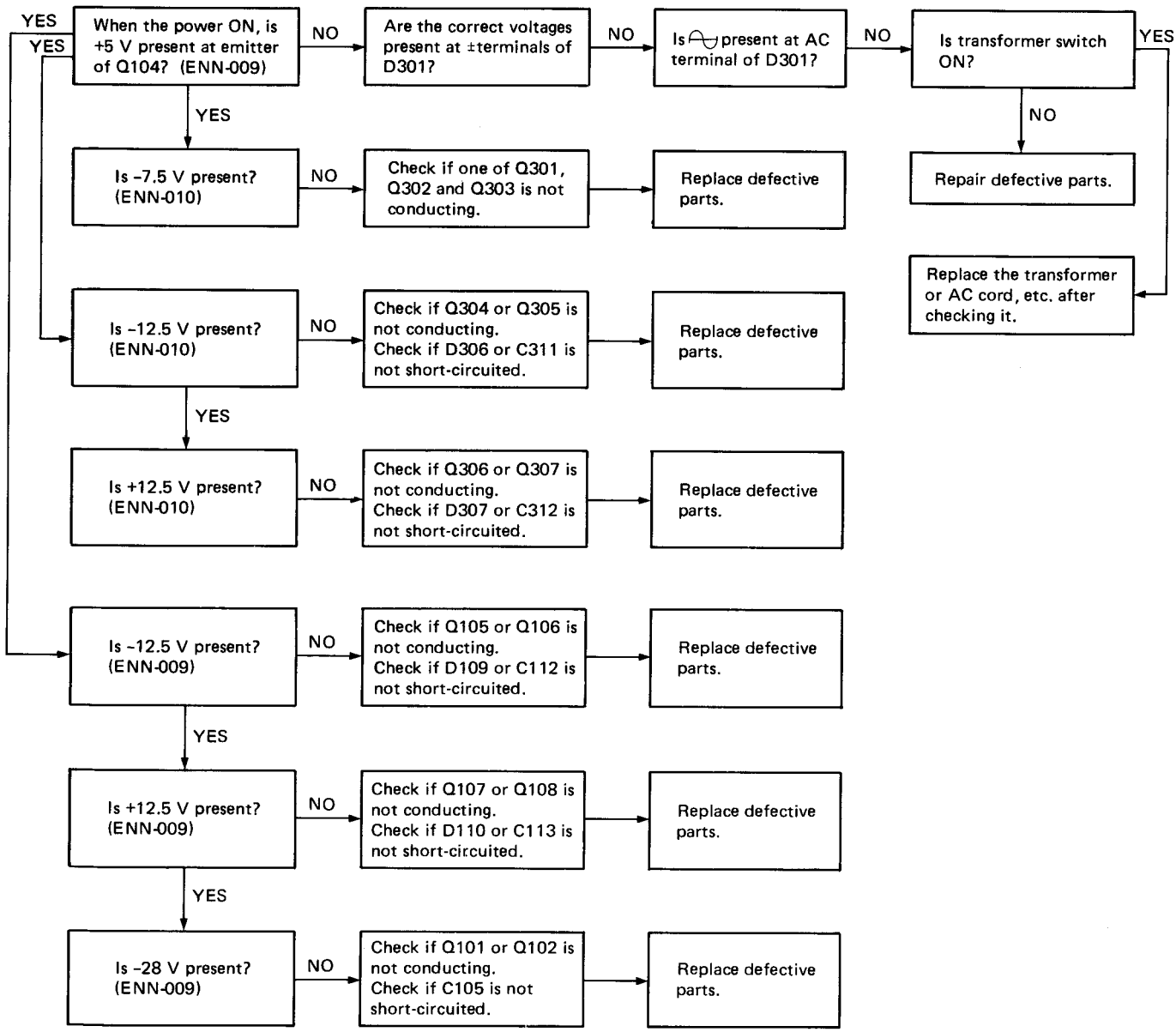
Slider servo section


Are voltage about 10 V at Q329 collector and about -10 V at Q330 collector?
NO
Check if R480 or R481 is disconnected or C384 and C385 are short-circuited.
YES
Replace defective part.
NO
To power supply circuit section
YES
Is LED of disc in search lit when a disc is loaded?
YES
Does this player function correctly when playing?
YES
Normal
NO
To tracking servo or spindle servo section or check Q328 and its peripheral components.
NO
Is +3.5 V present at emitters Q329 and Q330?
YES
Check if the slider motor or connection wire is disconnected, etc. then repair defective part or check the limit switches (SW101, SW102) and their peripheral components.
NO
Is about +4 V present at Pin ⑦ of IC307?
YES
Check if Q329 is conducting or R479 is disconnected then repair defective part.
NO
4 ms
+5 V
0.1 ms
Is the waveform above containing the minus pulse of +5 V present at Pin ㉕ of IC102?
YES
Replace R474 if it is disconnected or IC307 if it is defective.
NO
IC102 defective; check SW102 lead in switch, etc. or check micro-computer IC101 and its peripheral components. Proceed to loading, focus servo and front PCB sections.

Signal Processing Section


Is sound output?
NO
Is no sound output from both Lch and Rch?
NO
Check defective part by comparing the channel from which sound is output and the channel from which no sound is output from signal output terminal to IC106.
YES
Are voltages shown in the circuit diagram supplied from the power supply line to IC103, IC105, IC106, IC110, IC111, IC112 and IC113?
NO
To power supply circuit
YES
Is audio signal present at Pin①of IC110 and Pin①of IC111?
YES
Check the position where the signal is interrupted on the route until the signal output terminal then replace the defective part.
NO
Is audio signal present at Pin ⑰ of IC105?
YES
IC106 defective; check if R194 is disconnected and repair the defective part.
NO
Does clock 8.6436 MHz of IC103 oscillate?
YES
NO
X'tal defective; check if R191 is disconnected, C143 or C144 is short-circuited or open.
Is the waveform of 8-bit signal as shown in photo output at Pin ⑤ of IC103 during play?
YES
IC103 defective; replace IC104 because it is defective.
NO
Is normal play possible?
YES
Replace IC102 because it is defective.
NO
Proceed with repairing referring to other service hints depending on the defect.

Power supply circuit


When the power ON, is +5 V present at emitter of Q104? (ENN-009)
NO
Are the correct voltages present at ±terminals of D301?
NO
Is ~ present at AC terminal of D301?
NO
Is transformer switch ON?
YES
NO
Repair defective parts.
Replace the transformer or AC cord, etc. after checking it.
YES
YES
Is −7.5 V present? (ENN-010)
NO
Check if one of Q301, Q302 and Q303 is not conducting.
Replace defective parts.
Is −12.5 V present? (ENN-010)
NO
Check if Q304 or Q305 is not conducting. Check if D306 or C311 is not short-circuited.
Replace defective parts.
Is +12.5 V present? (ENN-010)
NO
Check if Q306 or Q307 is not conducting. Check if D307 or C312 is not short-circuited.
Replace defective parts.
Is −12.5 V present? (ENN-009)
NO
Check if Q105 or Q106 is not conducting. Check if D109 or C112 is not short-circuited.
Replace defective parts.
Is +12.5 V present? (ENN-009)
NO
Check if Q107 or Q108 is not conducting. Check if D110 or C113 is not short-circuited.
Replace defective parts.
Is −28 V present? (ENN-009)
NO
Check if Q101 or Q102 is not conducting. Check if C105 is not short-circuited.
Replace defective parts.

Note:
All constant-voltage parts of +5 V, −7.5 V, ±12 V, −28 V are connected electrically and as all voltages are not present when one of them is short-circuited or nearly short-circuited, take care when servicing.
Therefore, before starting servicing, first check which output of voltage is malfunctionning, then after repairing the malfunction, perform the steps described above.